

ABSTRACT

Title of Thesis: MASS PRODUCING AMERICA,
NEIGHBORHOOD REVITALIZATION IN
NORTH LAWNGDALE - CHICAGO

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 Master of Architecture, 2005

Thesis Directed By: Professor Ralph Bennett,
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 This thesis, which has been branded the MPA Project (Mass Producing America) is an exploration into the creation of an infill affordable housing solution to meet the needs of the North Lawndale Community of Chicago. Plagued by crime, violence, and economic disinvestment, it has been a victim of extreme urban blight. Economic conditions are now favorable for revitalization and the area is ideal for an exploration such as this. Within the project area are over two-hundred available building sites. This project explores how contemporary construction ideas can be used to make affordable, flexible and customizable homes. Moreover, since this problem is not unique to Chicago, it is possible that this solution could be applied in any number of cities throughout the country.

MASS PRODUCING AMERICA:
NEIGHBORHOOD REVITALIZATION IN NORTH LAWNSDALE - CHICAGO

By

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“Except the LORD build the house, they labour in vain that build it...”

- Psalm 127:1a

I would first like to thank my Lord and Savior, Jesus Christ for His strength and direction throughout this process.

I would also thank my parents. Without their continued love, support, encouragement, and above all prayers I could never have hoped to finish. My father’s compassionate listening ear and wise advice have served to calm my nerves more times than I can count over the past year. My mother’s warm witty sense of humor, energetic passion for life, and sincere concern for the well-being of others has been a constant motivation for me. Moreover, the memory of her clicking away at a typewriter long into the night during my youth to finish her Master of Social Work has frequently brought a smile to my face in studio at 3:00am. Thank you both.

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Table of Contents

Table of Contents	iii
List of Figures	iv
Section I Introduction	
Chapter 1: Conceptual Design Goals and Problems	1
Moving on Up ... and Out?	3
Custom Made or Mass Customization?	5
Are We Done Building Yet?	8
Chapter 2: Design Issues	12
Section II The Site	
Chapter 3: Site History	3
Chapter 4: Site Physical Condition	16
Building Typology	16
Zoning	20
Land Use	23
Chicago Boulevard System	26
Streets	28
Topography	28
Section III The Design	
Chapter 5: Precedents	30
Homan Square Development	30
Murray Grove Apartments	33
PATH Concept House	35
Operation Breakthrough	37
Chapter 6: Design Guidelines	38
Typology	38
Lot Development	39
Façade Articulation	39
Location of Major Spaces	41
Accessibility	41
Affordability & Gentrification	41
Chapter 7: Design Schemes	43
Chapter 8: System Design	52
Reason	52
Site	56
Construction	61
Image and Flexibility	65
Chapter 9: Conclusion	75
Works Cited	78

List of Figures

Figure 1	Steward Brand's Six S's	9
Figure 2	Conceptual Diagram	11
Figure 3	Chicago's 77 Communities	13
Figure 4	MPA Figure Ground	14
Figure 5	Vacant Lot on 13 th Street	15
Figure 6	Vacant Lot on Roosevelt Rd.	15
Figure 7	Vacant Lot on Independence Blvd.	15
Figure 8	Diagrammatic Aerial Photo	16
Figure 9	Typical Residential Street	16
Figure 10	Typical Section Through Independence Blvd.	17
Figure 11	Typical Section Through Roosevelt Rd.	17
Figure 12	Typical Section Through Residential St.	17
Figure 13	Section of Typical Two-Flat	18
Figure 14	Aerial Photo of Independence Square	19
Figure 15	Vacant Lots on MPA Site	19
Figure 16	Zoning Map of N. Lawndale	20
Figure 17	Residential Zoning Restrictions	21
Figure 18	Business/Commercial Zoning Restrictions	21
Figure 19	Commercial Land Use	23
Figure 20	Commercial Buildings on Roosevelt Rd.	23
Figure 21	Religious Land use	23
Figure 22	Typical Storefront Church	24

Figure 23	Church on Independence Blvd.	24
Figure 24	Educational Land Use	24
Figure 25	Henson School	25
Figure 26	Herzl School	25
Figure 27	Chicago Boulevard System	26
Figure 28	Garfield Park	26
Figure 29	Independence Square	27
Figure 30	Chicago Major Street Grid	28
Figure 31	MPA Street and Alley Network	28
Figure 32	Original Sears' Tower	39
Figure 33	Homan Square Master Plan	39
Figure 34	Homan Square Block Configuration	31
Figure 35	Block Configuration Comparison Diagram	31
Figure 36	Unit Size Study	31
Figure 37	Homan Square Units	31
Figure 38	Homan Square Unit Type "B"	32
Figure 39	Homan Square Unit Type "D"	32
Figure 40	View of Murray Grove Apartment	33
Figure 41	Murray Grove Apartments Under Construction	33
Figure 42	Murray Grove Apartments Under Construction	33
Figure 43	Exploded Axon of Unit	34
Figure 44	Murray Grove Units Diagram	34
Figure 45	Murray Grove Modules Diagram	34
Figure 46	PATH Concept House Plan	35

Figure 47	PATH Utility Separation	36
Figure 48	Typical Two Flat Floor Plan	38
Figure 49	Typical Two Flat Elevation	39
Figure 50	Diagram of Street Façade on Infill Lot	40
Figure 51	Diagram of Street Façade on Corner Lot	40
Figure 52	Diagram of “Book Shelf” Approach	43
Figure 53	Diagram of “Lego” Approach	43
Figure 54	Study Model - 9’ x 18’ Structural Frame	44
Figure 55	Study Model - Front Building with Structural Expansion to Rear	44
Figure 56	Study Model - Lego Approach	44
Figure 57	Study Model - Base Building with Flexible Interior	45
Figure 58	Study Model - Base Building with dedicated expansion areas	45
Figure 59	Study Model - Context Buildings	45
Figure 60	Building Block Concept Board	47
Figure 61	Scaffolding/Infill System Concept Board	49
Figure 62	Weathering Shed / Internal Pods Concept Board	51
Figure 63	Presentation Board “Reason 1”	53
Figure 64	Presentation Board “Reason 2”	54
Figure 65	Presentation Board “Reason 3”	55
Figure 66	Presentation Board “Site 1”	57
Figure 67	Presentation Board “Site 2”	58
Figure 68	Presentation Board “Site 3”	59
Figure 69	Presentation Board “Site 4”	60
Figure 70	Presentation Board “Construction 1”	62

Figure 71	Presentation Board “Construction 2”	63
Figure 72	Presentation Board “Construction 3”	64
Figure 73	Presentation Board “Flexibility 1”	67
Figure 74	Presentation Board “Flexibility 2”	68
Figure 75	Presentation Board “Flexibility 3”	69
Figure 76	Presentation Board “Flexibility 4”	70
Figure 77	Presentation Board “Image 1”	71
Figure 77	Presentation Board “Image 2”	72
Figure 77	Presentation Board “Image 3”	73
Figure 77	Presentation Board “Image 4”	74

PART I: INTRODUCTION

Chapter 1: Conceptual Design Goals and Problems

“Eradicate from your mind any hard and fast conceptions in regard to the dwelling-house and look at the question from an objective and critical angle, and you will inevitably arrive at the “house machine,” the mass produced house, available for everyone, incomparably healthier than the old kind (and morally so, too) and beautiful ...”

-- Le Corbusier, 1931

This thesis seeks to address three main issues through the design of an affordable housing building system. First, this thesis challenges the traditional notion that, within urban settings, people “grow out of,” or want to move out of neighborhoods as their families develop. Second, this thesis proposes that given the current state of technology, everyone can afford to have a custom house. Finally this thesis will explore the idea that a house is never finished being built. That is, families are ever-changing, and the structures that house them should be as well.

Moving on up... and out?

“Well we’re moving on up, to the east side... To a deluxe apartment in the sky....

We’ve finally got a piece of the pie.”

-- “The Jeffersons” Theme Song

Those words found in the famous theme song of the 1970s sitcom, “The Jefferson’s” echo the long held American ideal that if you work hard and really “play the game right,” anyone, especially minorities and immigrants, can “move up.” You can have a bigger apartment, nicer furnishings, and even a maid. Traditionally in America the realization of this dream comes with the stipulation that you also physically move. This thesis, however, poses the question, can you have all of these luxuries and not leave the community and the support system that has allowed you to become who you are?

According to the US Census Bureau, over forty-million Americans (14% of the overall population) moved between 2002 and 2003 (Schachter 2). Of these, 59% were moves within the same county. Moreover, when asked why they moved the leading response was “housing-related reasons.” Most were interested in home ownership, new or better housing, or cheaper housing. Amazingly, only 4.7% said that they were moving because they wanted to live in a better neighborhood or an area with less crime.

This data suggests that most people enjoy the stability that comes with living in the same area over an extended period of time. The reasons for this are manifold. Residential longevity results in stronger bonds and relationships with neighbors, children can develop within the same peer group, and the longer one stays in a given location, the more personal investment in the neighborhood increases. It can also be argued that from

a physiological perspective most people feel safer (regardless of how “safe” the area may be) in an area that they are familiar with.

This thesis proposes that architecture can be a tool to aid in neighborhood stabilization. By developing a housing system that is adaptable to people at various times in their life, they can stay in the same neighborhood from their younger twenties to old age. As their family needs change, their house can expand or adapt to suit them. Also as their financial income improves and their taste is “upgraded,” the house can simultaneously be “upgraded” to accommodate them.

Custom-Made or Mass-Customization

“Mass production was the ideal of the early twentieth century. Mass customization is the recently emerged reality of the twenty-first century.”

-- Stephen Kieran & James Timberlake

In the early decades of the twentieth century, the founders of modernism, especially Le Corbusier and Gropius, looked to the then new manufacturing industries to somehow transform our profession and society. They envisioned architecture, especially housing, being elevated to a point where good design would be available to the masses. In our contemporary society where only 2% of new home buyers have the luxury of working directly with an architect (Bell 36), the time has finally come for us to adopt the methods and practices of other industries to make architecture available to the masses.

In their Book, “Refabricating Architecture,” Stephen Kieran and James Timberlake draw a number of comparisons between the automotive industry and the architectural profession. They point out that the automotive industry has in recent years abandoned the traditional assembly line approach to manufacturing automobiles and has instead moved to a system of integrated modules (Kieran and Timberlake 17). For example, the front suspension is conceived of as a module, as is the engine, the cockpit, and the front fascia. Each of these modules may be manufactured in separate places. They arrive at the main assembly plant in largely complete form and are joined together to make the final car.

The advantages to this approach are higher quality, less manufacturing time, and less cost. Car manufactures have found that since each module is manufactured by a

plant that specializes only in its particular module, the overall quality of the module and the car is higher than a plant that was attempting to specialize in an entire car. Kieran and Timberlake point out that since adopting this method the overall time for moving a car from conceptual design to production has been reduced from 58 months to 38 months. Also, since the modules can be simultaneously produced at various locations, the overall time of assembly is reduced and the savings can be passed onto consumers.

If then, this analogy was carried to the next step, one could envision a large amount of flexibility being introduced into process. For example, one could imagine that the cockpit module plant began designing and producing several different types of cockpits. Also, each of these different types of cockpits was made in such a way that they could be interchangeable, so a car could have either “Cockpit A,” “Cockpit B,” or “Cockpit C” and each could seamlessly replace the other. Now, let’s assume that all of the other module plants followed suite and began producing multiple designs for each of their modules. Lastly, one could suppose that the car manufacturer allowed the consumer to dictate which modules he wanted in his car. One begins to perceive a situation where Tom may decide to have Cockpit A, Engine F, and Front Suspension D. While Tina may decide to have Cockpit F, Engine A, and Front Suspension C. We now have the makings of mass-customization.

Public demand for choice currently makes the ideal of mass-customized architecture more of a possibility than ever before. The furniture store, Ikea offers several furniture

lines where the consumer can pick and choose different parts of an overall furniture system and simply put the ones they want together. For more than a decade Dell computers has been giving the consumer the choice to have a customized computer delivered to their door. Social critic, Mark Andrejevic, proposes that “it is the givenness of the rules that keeps the ‘mass’ in ‘mass customization’” (Andrejevic 49) Ikea and Dell have set up the basic “rules” or framework that the consumer must work in, but beyond that the individual has the option of deciding what particular elements they want. Architect Frank Lloyd Wright began to tap into this idea when he developed his Usonian Houses which, while not modular, were designed based on a grid that conformed to the basic framing dimensions of wood construction. This system gave the architect maximum flexibility while working with wood, and also helped to visually unify the Usonian Houses.

The housing industry, more than any other segment of architecture has embraced the idea of prefabrication. Today, even in traditional “stick-built” homes, large segments of roof trusses, floor joist and wall framing segments, are constructed off-site and simply shipped to the site. This thesis will propose the development of a standard three dimensional measurement system, or grid. All of the components of the house (structure, exterior walls, interior partitions, cabinetry, etc.) would be manufactured based off of this “module.” Working within this set module will allow for maximum flexibility in design and future manipulation of the units. This system would combine the virtues of modular construction, prefabrication, and mass customization.

Are we done building yet?

“One of the things which we are searching for is a form of architecture which, unlike classical architecture is not perfect and finite upon completion”

-- Sir Richard Rogers

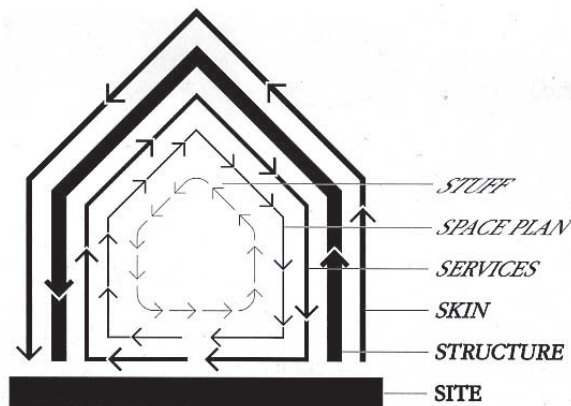
The final question that this thesis seeks to address derives from the earlier question of neighborhood stabilization. If one contends that a person or a family can live in the same neighborhood for extended periods of time, how does the architecture accommodate the change that occurs in their lives. In his book, *How Buildings Learn*, Steward Brand makes an argument that the most successful and beloved buildings have traditionally been those that can adjust to change quickly.

More often than not, when a family has the luxury of working directly with an architect, the house is designed and customized to meet their needs at that particular moment in time. While occasionally a spare room may be designed for a child not yet born, little thought is given to how the special needs of that family may change, five, fifteen or twenty-five years down the road. This thesis claims that in reality a house is never truly complete.

The Open Building Movement provides a good conceptual base to help understand how one could arrive at a realistic house that meets the demands of ever-changing occupants. This movement which dates back to the 1960s was pioneered by N. John Habraken. Habraken suggested that a “natural relationship” existed in healthy living environments. This relationship was characterized by both the community and the individual having a clearly marked “scope of control and responsibility” (Kendall 3). In

other words, a building has two sets of obligations; one to its owner or occupant and one to the larger community. Those obligations which involve the larger community deal with siting and exterior appearance while decisions about interior layout belong to the occupant.

More specifically within a building, the movement proposes that a house is actually composed of a number of different systems, each with its own challenges and lifespan. Expanding on the work of Frank Duffy, Brand makes a case for viewing a building as a composition of six layers (Brand 13)



[Fig 01. Diagram of Steward Brand's "Six S's"] from *How Buildings Learn*

The first three of Brand's S's deal with the larger and more external functions of a building. The **Site** comes first and is considered the most stable layer, since the earth will be around long after the building. **Structure** is the second layer. It

sometimes considered to be the most expensive part of the building, however

within housing construction it should be noted that interior finishes typically consume a considerable portion of the budget and sometimes surpass structure in construction cost. Even so because of the implications of moving structural elements, most people try to avoid changing the structure of a building when renovating. **Skin** is considered the next important because of the crucial role it plays in actually enclosing the structure and the home, however over the life of the building it is more vulnerable to being changed or

adapted to match current aesthetic trends. Brand claims that on average a building's skin changes every 20 years whereas structure can last from 30 to 300 years. Unlike structure, which people go out of their way to avoid changing, it is very common for home owners to use vinyl siding or new windows to dress up an old building.

The last three S's deal specifically with the interior workings of the home and those systems which help to make the space more comfortable. **Services** is the first of these and it deals with "the guts" of the building. Plumbing, electrical, mechanical, and HVAC fall into this category. Given the ever changing world of technology and how soon new innovations in the building industry are out-dated, these systems may need to be upgraded as often as every 7 to 15 years. The **Space Plan** is the next layer and it is comprised of partition walls, ceilings, doors and floors. These are among the first victims of the house to meet with the ax when renovation plans begin. The final layer is what Brand had termed **Stuff**. Stuff includes tables, chairs, desks, lamps, couches, ect. All the things that people buy and place in their homes to help define space. Depending on the nature of the home and its owners these may change anywhere from weekly to yearly.

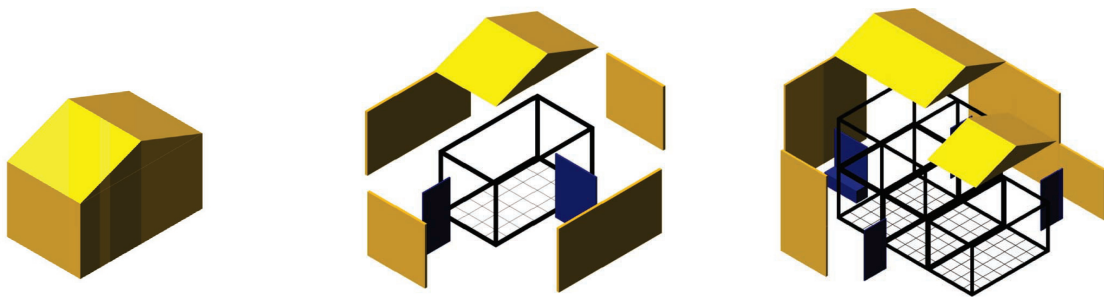
Once one understands the principles of Open Building, the next step is for the architect to do everything in his power to keep these layers as separate as possible. Architects often spend hours and hours in their offices resolving details to bury the services in the walls and ceilings. If, however, one anticipates that the walls will likely change before the electrical wiring and plumbing, it is only logical to keep the systems out of the wall so one can in fact move walls without major repercussions.

Chapter 2: Design Issues

The design issues of this thesis are derived from the realization that many of the goals and question raised in the previous section do not belong exclusively to the discipline of architecture, but rather are shared by sociology, economics, and psychology. Even so, architecture can be used as a tool to stimulate a discussion about these ideas. While architecture alone may not solve any of these problems, it can help us arrive at a better understanding of the problem.

To this end, this thesis seeks to produce the schematic and conceptual design of an affordable housing building system. As discussed in the Design Goals section, this system is perceived as being ever-changing and ever-growing. This design will hinge on an exploration of available technical and structural innovations that would make such a design plausible.

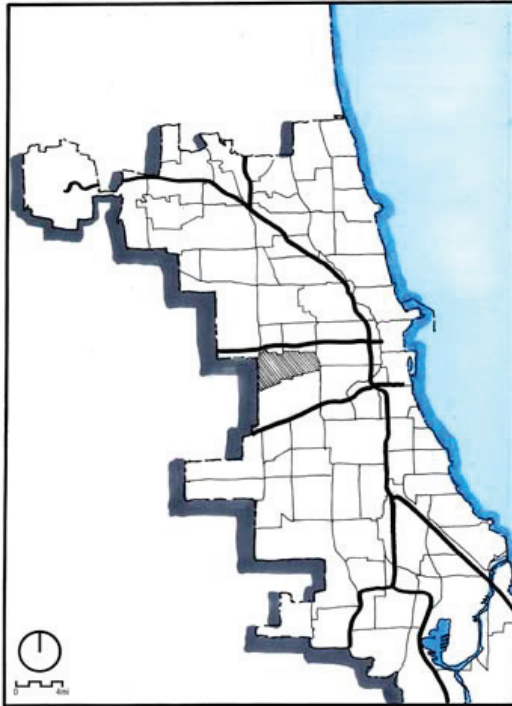
Also, in keeping with the desire that this system be used to aid in neighborhood stabilization, this thesis seeks to introduce this system into an existing community, displacing as few residents as possible. Therefore, a primary objective of this thesis will be to keep as many of the functional existing structures as possible.



[Fig 02. Conceptual Diagrams] Proposed expansion of a house over time

PART II: THE SITE

Chapter 3: Site History



[Fig 03. Chicago's 77 Neighborhoods]

The site chosen for this thesis, the MPA Project (Mass Producing America), lies within the North Lawndale community of Chicago. The area is located roughly 12 minutes (5 miles) due west of the downtown central business district (commonly known as “the Loop”). The neighborhood traces its roots to 1870 when the real-estate firm of Millard and Deeker subdivided what was then an open prairie land on the city edge. In the early decades of the 20th century the population grew rapidly. At this time, the area was heavily populated with

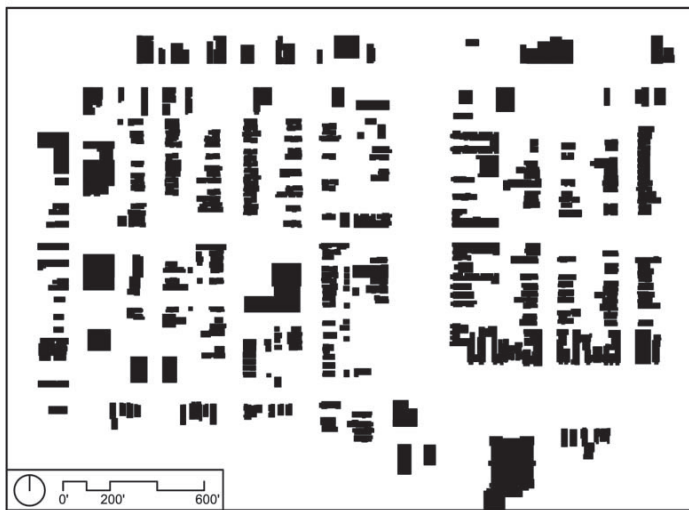
Jewish immigrants of Russian descent (HICA 2).

In the 1950s the City of Chicago found itself on the receiving end of ‘the great migration’ of African Americans relocating from the south. The North Lawndale neighborhood became a major settling spot for these newcomers. The future of the area was dramatically altered as the more established Jewish community fled, leaving a once thriving commercial and retail center (Roosevelt Road) barren.

The area reached its peak population of over one-hundred-and-twenty-five-thousand

residents in the 1960s. By this time, the area was mostly comprised of African Americans who either lacked the financial resources to maintain the housing stock or withheld those funds. As a result, many of the buildings fell into disrepair and were abandoned. Another devastating effect occurred in 1968 when residents rioted following the assassination of Dr. Martin Luther King Jr. Many structures were lost to fire during the protest. The grim situation was exacerbated in the 1970s when Sears Roebuck & Co. relocated its international headquarters from North Lawndale to the Sears Tower taking some fifteen-thousand jobs with it.

In the 1990s the city took a firm stance on abandoned property, citing it as a public hazard and began an aggressive demolition campaign. Today there are over five-thousand



[Fig 04. Figure Ground of the MPA site] This image illustrates the abundance of vacant land in the area

vacant parcels (see fig. 15, p. 20) in the area and over half of them are owned by the city. Since 1960 the area has lost roughly 40% of its housing stock and its population has declined from one-hundred-and-twenty-five-thousand to a meager forty-one-thousand (Keating and Krumholz 67).



[Fig 05. Vacant lot on 13th street]



[Fig 06. Vacant lot on Roosevelt Rd.]



[Fig 07. Vacant lot on Independence Blvd.]

Chapter 4: Site Physical Condition

The MPA site is located centrally to the North Lawndale Community. The hard site boundaries are defined by Roosevelt Road to the north, 14th Street to the south, Pulaski Road to the west, and Lawndale Ave to the east. The Eisenhower Expressway has an exit located on Independence Boulevard roughly one mile north of the site, thus Independence acts as the front door to the North Lawndale Community.



[Fig 08. Diagrammatic Aerial Photo] MPA Site in Red, I-290 to the north, Garfield Park to the far north, Douglas Park to the east

Building Typology

Vacant lots aside, the physical character of the site has the potential to be rather attractive. The majority of the surviving housing stock dates from the turn of the 20th century. The fabric of the area is dominated by two-flats with the occasional apartment building,

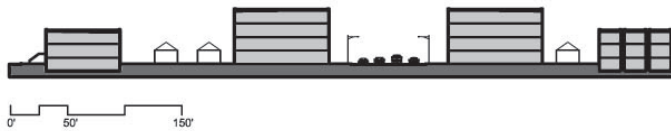


[Fig 09. Typical Residential Street]

the first floor is generally 6' feet above grade. This arrangement allows for a generous amount of light to enter the basements. The height also encourages the use of porches throughout the site. The most commonly used building materials are limestone and brick. All of the lots in the area are rear loaded (accessibly by alley) and three foot gangways are prevalent. As is the case throughout the city, electricity and phone lines reach the site via the alleys, while gas and water mains are located off of the street.



[Fig 10. Typical Section through Independence Blvd.] 119' green strip with 40' streets on either side, three traffic lanes in either direction, 270' building face to building face

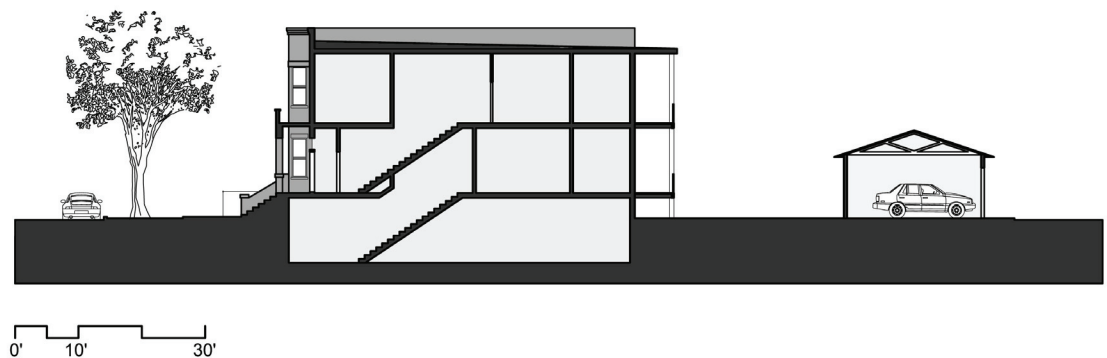


[Fig 11. Typical Section through Roosevelt Rd.] Street width is 65' curb to curb, 104' building face to building face, 4 lanes of traffic, 20' sidewalks



[Fig 12. Typical Section through Residential Street.] Street width is 28' curb to curb, 12' planting strip, 6' sidewalks, 15' - 25' building setbacks, 107' building face to building face

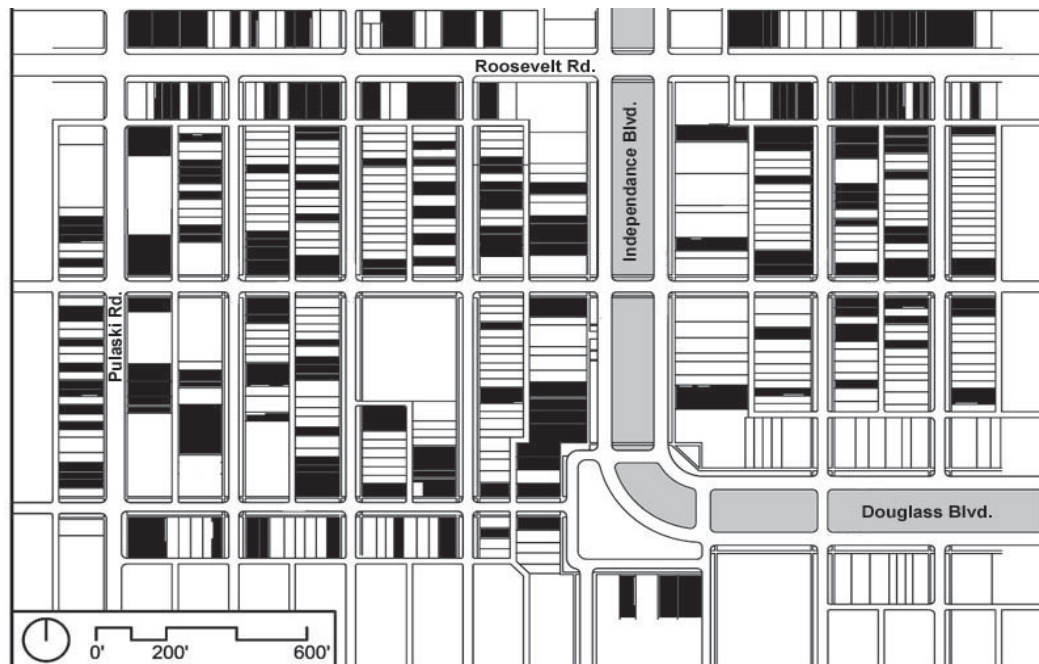
The two-flat building type is essentially a stacked duplex in which the lower floor and basement are lived in by the owner, while the upper floor is rented out. One generally enters into a common vestibule from the porch. Each unit then has a door (one leading into the first floor and the other leading to a stair well). While the upper unit can be rented out, frequently the same family owns and lives in both the upper and lower units. For example, it is not uncommon for children to get married and live above the parents.



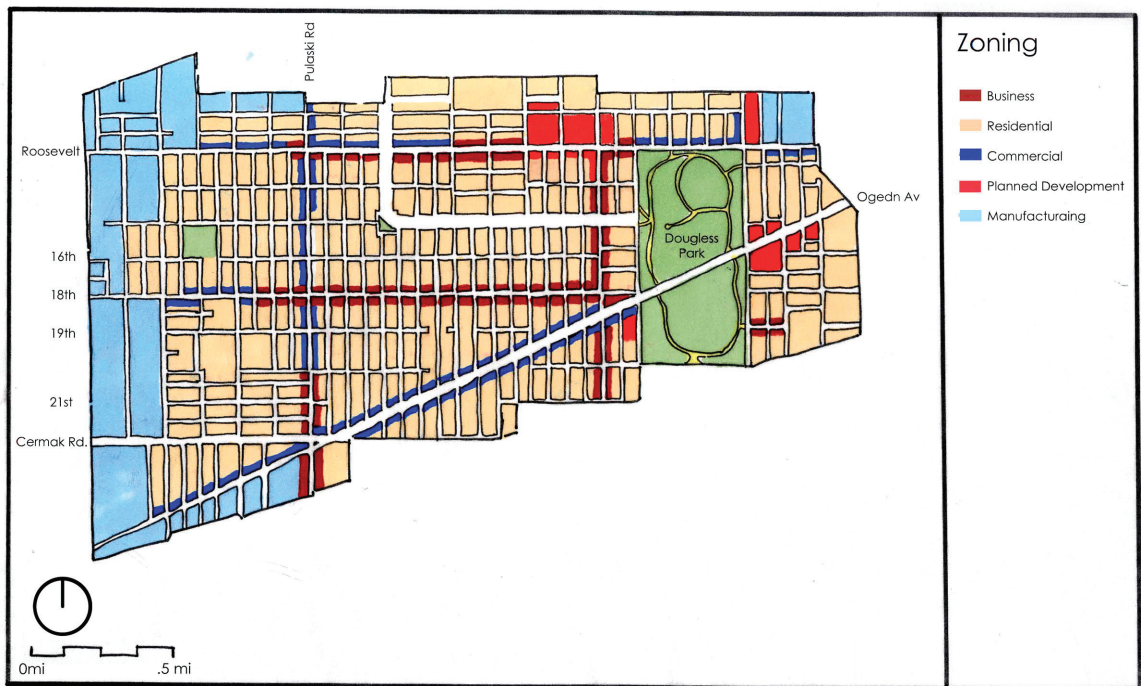
[Fig 13. Section of Typical Two-Flat]



[Fig 14. Aerial Photo of Independence Square]



[Fig 15. Vacant Lots within MPA Site] - Darkened Lots are Vacant

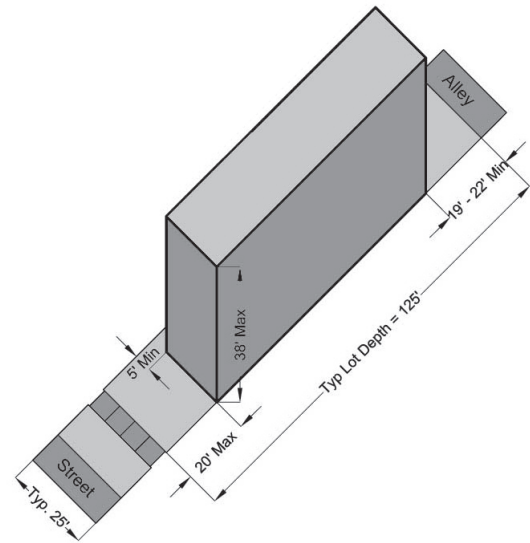


[Fig 16. Zoning Map of N. Lawndale]

Zoning

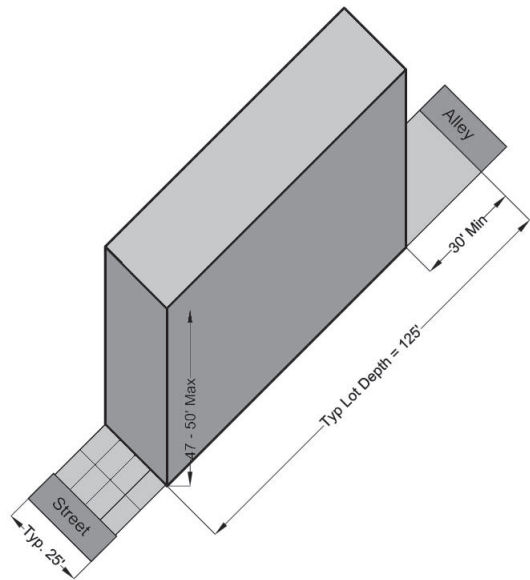
The governing zoning ordinance for the City of Chicago was enacted on November 1, 2004. Most of the site falls into the category of RT-4 residential zoning. This zoning is intended to accommodate detached housing, two-flats, townhouses, and low-density multi-residential buildings (See fig. 17, p. 22). Most of the building sites are located on lots which are 25' by 125' (3,125 sq. ft.) The minimum lot area for this zone is 1,650 sq. ft. A lot must be able to accommodate 1000 sq. ft. for every dwelling unit proposed on a given site (500 sq. ft. per Single Room Occupancy), and the maximum Floor Area Ratio is 1.2. Front setbacks are dictated by the average setback of the neighboring lots or 20', whichever is less. Minimum rear setbacks are dictated by the lot depth and range

from 24% to 28% of the lot depth, or 50', whichever is less. There must be 65 sq. ft. of open rear yard space for every dwelling unit on a given lot, or 6.5% of the lot area, whichever is greater. If multiple buildings are proposed on a single lot, there must be a minimum of 30' separation. Building heights are restricted to 38.' 17.5% of the front façade must be composed of doors or windows.



[Fig 17. Residential Zoning Restrictions]

The two major streets on the site, Roosevelt Road and Pulaski Road are zoned C1-2 commercial and B3-2 business. C1 and B3 zones are intended to accommodate retail, service, and commercial uses that are compatible with the existing character of the neighborhood. Commercial and Industrial uses may not exceed 25,000 sq. ft. of the ground floor and may not be smaller than 800 sq. ft. or 25% of the lot area, whichever is greater. Residential dwelling units are allowed above the



[Fig 18. C1-2 and B3-2 Commercial / Business Zoning Restrictions]

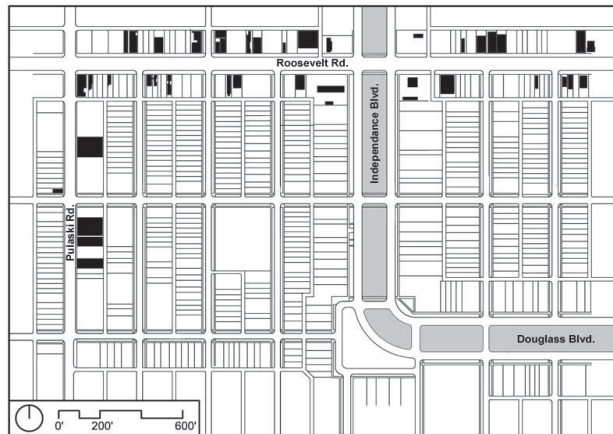
ground floor in both zones. The lot must contain at least 1000 sq. ft. per residential unit. There is a maximum 2.2 Floor Area Ratio. There are no required front setbacks and the minimum rear setback is 30'. There are no side setback requirements. Building height restrictions vary between 47' to 50' depending on if the ground floor is used for commercial activity.

Land Use

Based upon the zoning code, four basic types of uses have developed within the MPA site. Naturally, the predominate use is residential, the nature of which has been discussed previously.

The second major use would be commercial. As figure nineteen shows, most of the commercial activity in the area is on Roosevelt Road. The commercial activity is composed of small shops, restaurants, fast food establishments, and gas stations. Most of these buildings contain residential units above the ground level.

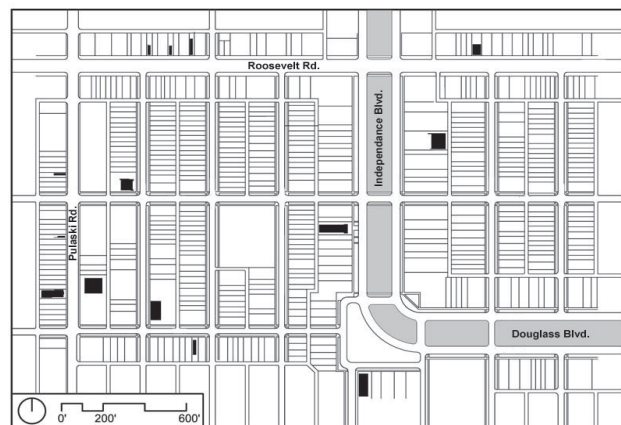
The third major use would be religious. There are currently fourteen churches located within the site. These range in size from small “storefront” congregations to large churches that have moved into structures that were originally designed to serve as Jewish



[Fig 19. Commercial Land Use]



[Fig 20. Commercial Buildings on Roosevelt]



[Fig 21. Religious Land Use]

synagogues at the turn of the century. The latter of these serve as local landmarks for the community.

The last major land use is education. There are six educational institutions located within the site boundaries. Henson School (figure 25), located in the center of the site area is a elementary school housing up to grade six. Herzl (figure 26), located just to the east of Independence Square is a middle school for 7th and 8th Grades. Herzl's Classical Greek revivalist building is considered to be historically significant by the City of Chicago Commission on Chicago Landmarks' Historical Resources Survey.



[Fig 22. Typical Storefront Church on Pulaski Rd.]



[Fig 23. Church on Independence Blvd.] built to serve as a synagogue



[Fig 24. Educational Land Use]



[Fig 25. Henson School]



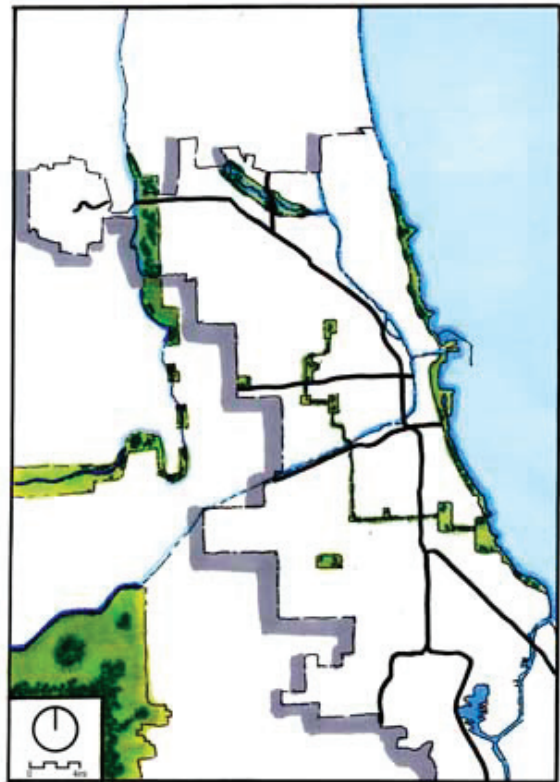
[Fig 26. Herzl School]

City Boulevard System

In 1837 the City of Chicago was incorporated with its motto, “Urbs et Horto,” or “city in a garden.” This vision was realized in 1869 when the state of Illinois created three park districts (north, south, and west) and charged them with the creation of nine large parks that would be connected through a system of boulevards, forming an “emerald crown” around the city center. The three large parks on the city’s west side Douglas, Garfield, and Humboldt were designed by Chicago architect, William LeBaron Jenney.

Garfield park (184 acres) lies about one mile to the north of the MPA site, while Douglas park (174 acres) is located about one mile to the east. Independence Square marks the turning point where Douglas Boulevard turns north to meet

Garfield Park and becomes Independence Boulevard. While the boulevard system was initially designed to accommodate carriage rides and leisurely Sunday afternoon promenades, today Independence and Douglas Boulevards are major traffic ways for cars.



[Fig 27. Chicago Boulevard System]

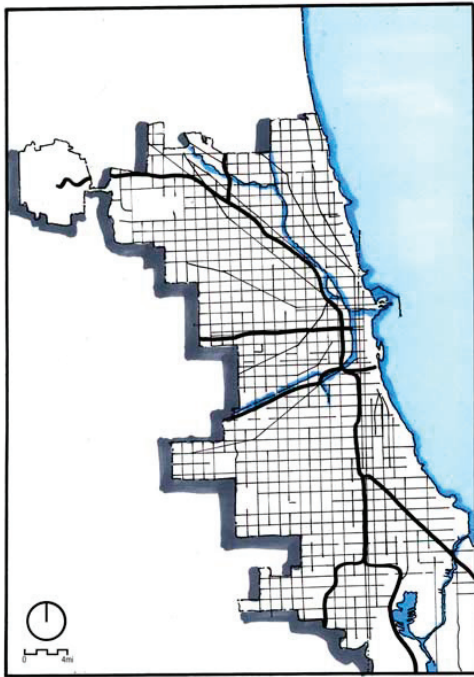


[Fig 28. Garfield Park]

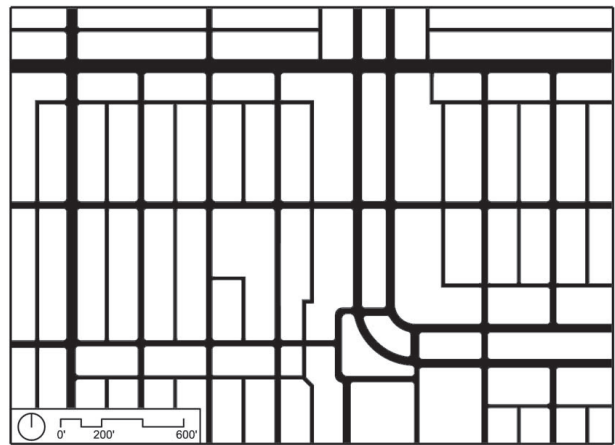
One unfortunate effect of this has been that Independence Square has become a traffic circulation zone that is extremely uninviting to pedestrians or residents. The square was further compromised by the addition of a one story learning center that was built by the Chicago Public School system in the late 1960s.



[Fig 29. Independence Square]



[Fig 30. Chicago Major Street Grid]



[Fig 31. MPA Site Street and alley Network]

Streets

In character with the City of Chicago, all streets within the site are arranged on a grid. Within the city major streets are located every mile and roughly eight city blocks (long dimension) can fit between two major streets. The grid in this area has a north-south bias with blocks that are roughly three-hundred feet by six-hundred-and-thirty feet.

Topography

For building purposes, the topography of the site can be considered flat. There is a slight 1' slope down to the west that is spread out over the entire area. The site is not located in a flood plain.

PART III: THE DESIGN

Chapter 5: Precedents

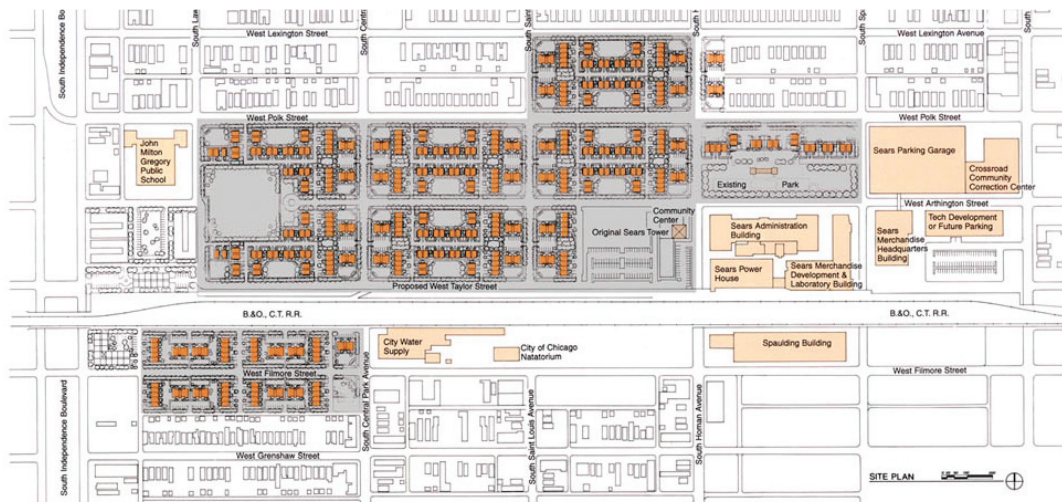
Homan Square, Chicago

*Nagle Hartray Danker Kagan McKay
Architects Planners Ltd.*

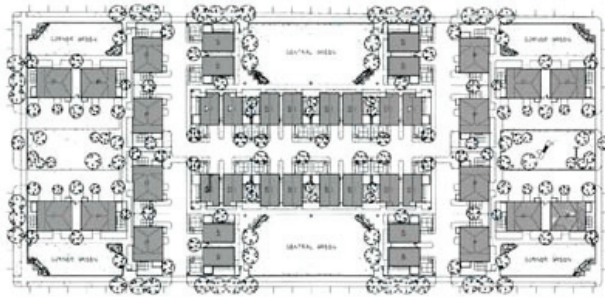
Completed in 1999 the Homan Square development was the first major housing development undertaken in North Lawndale since the early nineteen hundreds. Located on the site of the original world headquarters of Sears Roebuck and Co., the development included nine city blocks (55 acres) and introduced 600 new housing units into the area. One major objective of the developers was to create a fifty-fifty mix of rental units and owner mixed-income level units.



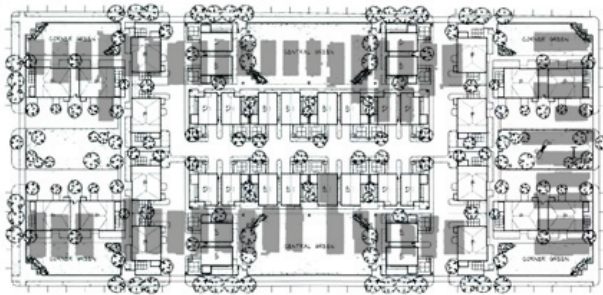
[Fig 32. Original Sears' Tower]
The tower stands in Homan Square as a reminder of Sears' ties to the history of the area



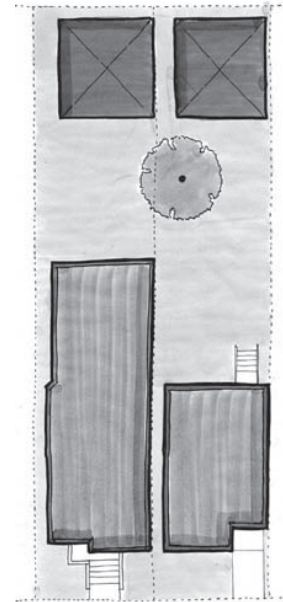
[Fig 33. Master Plan of Homan Square Development]



[Fig 34. Homan Square Block Configuration]



[Fig 35. Block Configuration Comparison Diagram] Typical N. Lawndale block laid on top of Homan Square Block



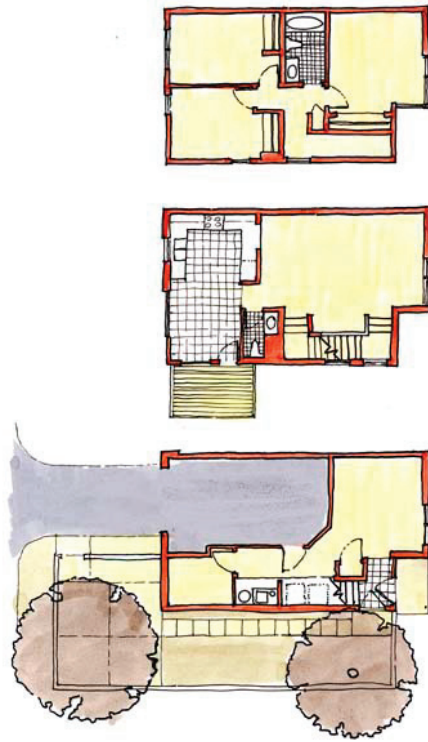
[Fig 36. Unit Size Study] Typical N. Lawndale Two-Story Two-Flat Next to Two-Story Homan Square Unit

To this end, the plan included a mix of single family detached, duplex, and rental units.

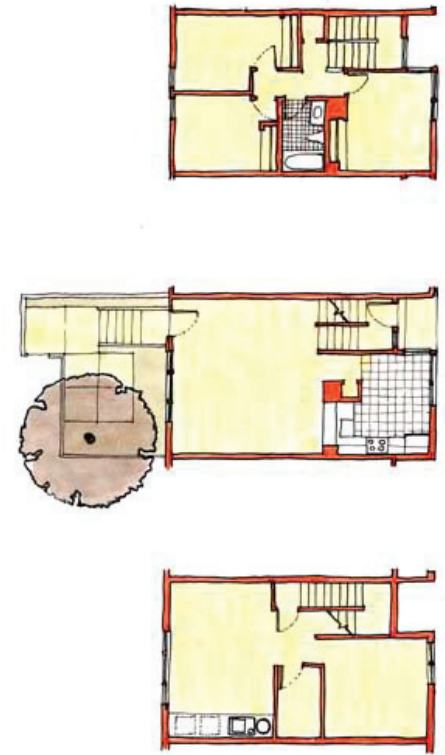
Contrary to the typical Chicago block layout, with units lined up at the block edge, the Homan Square developers chose to create communal front lawns with the units lining the edges. While this arrangement allows for a larger continuous green space and more “eyes



[Fig 37. Homan Square Units] View from Street



[Fig 38. Homan Square Unit Type “B”]



[Fig 39. Homan Square Unit Type “D”]

on the street,” the definition of the street is completely lost, having no definable edge. Homan Square has reached a density of 11.2 dwelling units per acre, compared to 17 dwelling units per acre in the majority of North Lawndale.

Since Homan Square is less than one mile away from the MPA site, it offers an excellent example of what is expected in market-rate housing in the area. Ranging between 1,000 and 1,670 square feet, the units are considerably smaller than other units in the North Lawndale neighborhood.

Murray Grove, London

Cartwright & Pickard, Architects

The Murray Grove apartment building is an excellent example of what can be done with a prefabricated modular building system. The thirty unit structure is composed of seventy four modules, each with the same overall dimensions. The single-bedroom units are composed of two modules, while the two-bedroom are composed of three modules (Figures 44 & 45). The modules were constructed off site by Yorkon Limited, then shipped to the site and hoisted into place by cranes. Once the modules were in place, a prefabricated deck and cladding system was installed over the units. Finally the central stair piece was put in place (also constructed using prefabricated modules). The overall time of construction on-site was only ten days.



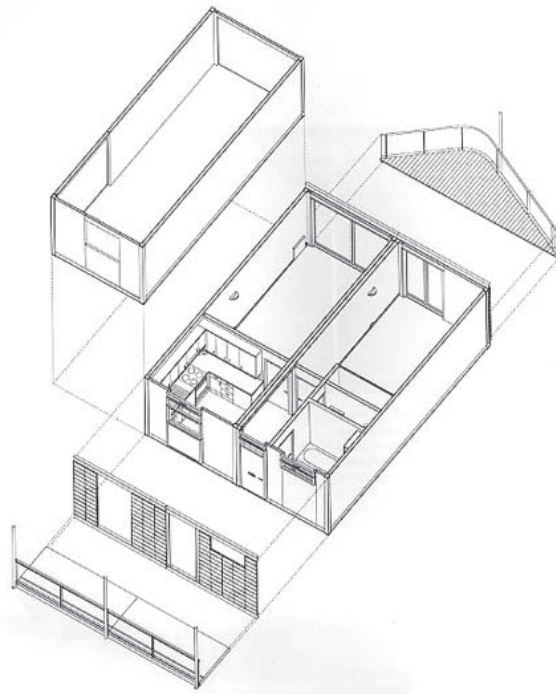
[Fig 40. View of Apartments]



[Fig 41. Apartments Under Construction]



[Fig 42. Apartments Under Construction]



[Fig 43. Exploded Axon of Unit]



[Fig 44. Units]

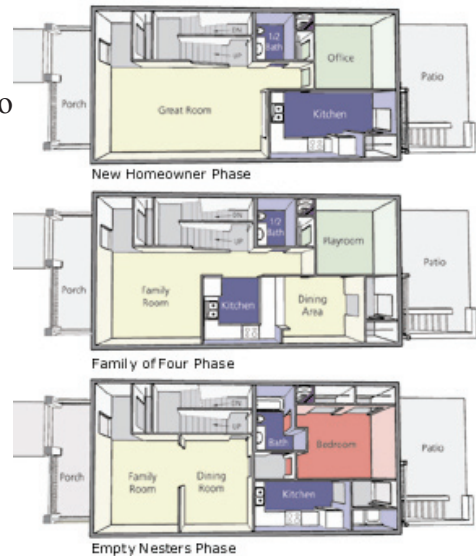


[Fig 45. Modules]

PATH, Concept House

*Torti Gallas and Partners, Architects with
US Department of Housing and Urban Development*

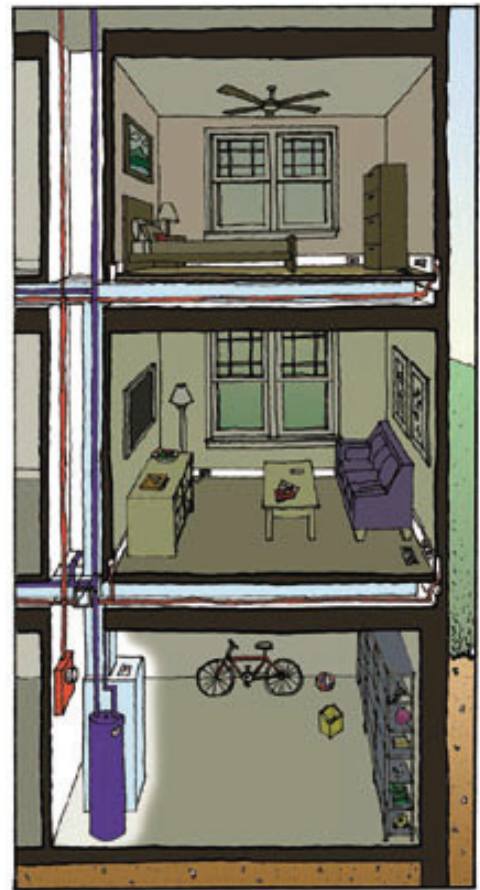
The Partnership for Advancing Technology in Housing, or PATH is a program of HUD that seeks to accelerate the integration of innovative technologies in the housing construction market. Developed in 2004, the PATH Concept Home was a non-built project intended to demonstrate how a home could evolve with a family. The objective was to design a house that could accommodate changing lifestyles, could adapt to technological advances, be easily repaired or remodeled, and look custom built. In addition to these, the architects proposed that by the year 2010, such a house could be built from the ground up in 20 days.



[Fig 46. PATH Concept House Floor Plans] These diagrams show how the Concept house is designed to change

To accomplish their objectives, the designers made use of four concepts. The “open building” concept discussed in the conceptual design goals section of this thesis was a leading idea. Structure, utilities, and floor plan are viewed as separate systems. The utilities and floor plan are designed to anticipate change, while the structure is conceived as being fixed. The second theme was to organize the utilities in a way that they are easily accessible. This is accomplished by creating open pathways for the piping and wiring and also by creating easily removable, floor, and ceiling panels to

conceal them. The third concept is to push for industry standardization of measurements and product sizes. Standardized measurements will allow components to be built by a variety of manufacturers in different locations and ensure that they will all come together on site. The final idea was to integrate subsystems, or allow elements of the house to do more than one thing. For example, the PATH house proposes that “wall coverings double as conduit for electricity, and roof shingles collect solar energy while they protect your house.”



[Fig 47. Utility Separation]

Operation Breakthrough

US Department of Housing and Urban Development

Began in 1969, Operation Breakthrough was a HUD sponsored initiative that sought to modernize the housing industry through “facilitating volume production of quality housing for people of all incomes” (HUD Challenge June 1972 p4). During the initial stages of the program, twenty-two different housing system producers (HSPs) were selected to participate. These HSPs represented a mixture of wood-framed modules, pre-cast concrete, plastic, and metal systems.

The organizers of Breakthrough realized that site planning was of the utmost importance. To this end, eleven different sites were chosen throughout the country (only nine were actually developed due to budget cuts). Each of these sites would play host to a mix of HSPs and would serve as demonstration grounds for the general industry. Within the sites, the Planned Unit Development approach to site planning was utilized to provide maximum flexibility in site layout and also minimizing the amount of paving, utilities, and recreation areas.

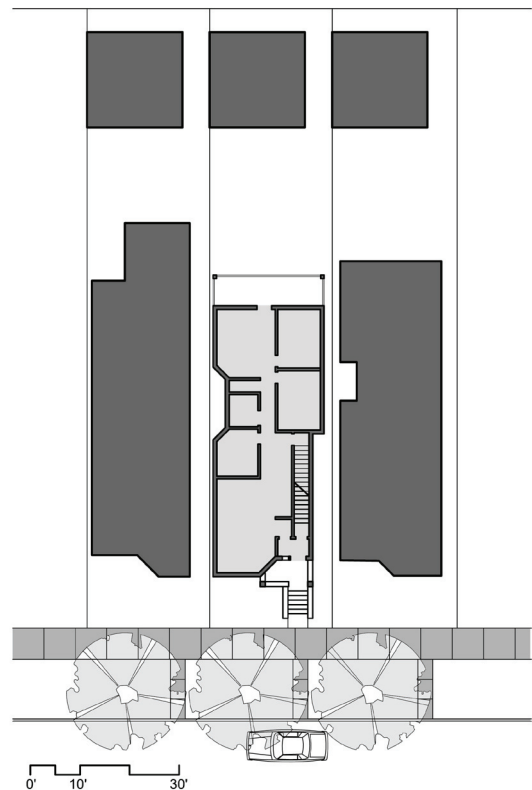
The main objective of Breakthrough was not necessarily to push the “architectural envelope,” but rather to stimulate and aid the industry by “breaking-through” legislative, transportation, and labor policies that were hindering the realization of a modernized housing industry. One major obstacle that HUD faced in development of the program was that of transportation. “The best factory built dwelling unit is of little value unless it can reach its destination intact and be economically competitive with those building products produced locally by conventional means” (HUD Challenge pp12).

Chapter 6: Design Guidelines

Because of the nature of the MPA building system being “ever-adaptable” and customizable it is necessary to establish a set of design guidelines. These guidelines will serve two purposes. First they will ensure that the overall character of the street is well defined and orderly. It is not the intention of these guidelines to regulate style, but rather to mandate a set of minimum requirements that each of the building sites will adhere to. A second purpose for the guidelines is to direct the development of the design process. The proposition of a house which is perpetually changing and possibly expanding is a rather vague pursuit. It is the objective of the following six sections to aid the designer and point him in a direction towards an end product.

Typology

While the MPA building system is not a traditionally constructed building, in its matured form it is conceived as being most similar to that of a typical Chicago two-flat. The two-flat is characterized by two dwelling units stacked vertically. There is usually an entrance hall located directly behind the main entrance which will lead either directly into the main level unit or to a stair hall which leads to the upper unit (See typical section, fig. 13, p.



[Fig 48. Typical Two-Flat Floor Plan]

19 and fig 68, p. 59). Customarily, the owner of the lot lives on the lower level (which is usually slightly higher in quality) while the upper level is either rented out or used for extended family members.

Lot development

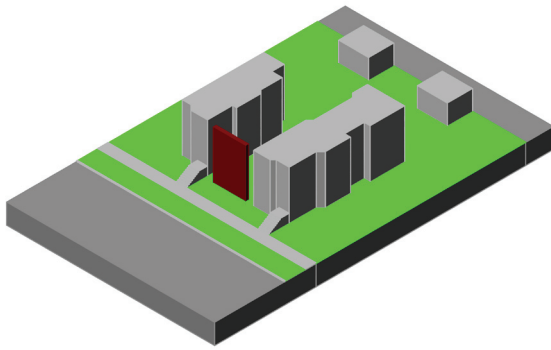
One of the larger goals of the MPA Project is to increase the number of rental properties available in the North Lawndale Community. One of the ways this will be accomplished is through the construction of accessory apartments when ever possible. This will make the inevitable gentrification process less offensive for the current residents, as there will be more alternatives available for them to remain in the area. It will also help the owners of the land, by giving them some amount of income to help defray the cost of maintenance and upkeep.

Façade Articulation

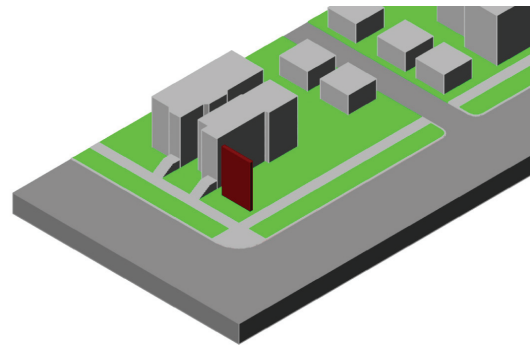
Within the MPA site there is a strong tradition of building facades being staggered through the use of major and minor bays. In keeping with this tradition, the street façade of all MPA units shall be divided into two or three non-equal bays indicated by a setback of no less than 2'. Where a corner building is being designed, with two street facades, these guidelines are intended to apply to the short



[Fig 49. Typical Two-Flat Elevation]



[Fig 50. Infill Lot Street Facade]



[Fig 51. Corner Lot Street Facade]

side, or the faced that is parallel to the façade of the neighboring infill houses. Where two bays are used, the larger bay should occupy 54% - 60% of the total width of the façade. Where three bays are used, the larger bay should occupy 50% - 65% of the total width of the façade and should be located between the two minor bays. The larger bay should be the closest to the street. A single primary entrance to the building should be accommodated through the principle façade and should be located a minor bay.

For infill units, the street façade must appear to be two to three stories and may be no less than 30' in height (height is restricted to 38' by the city zoning ordinance). Corner units should appear taller and may utilize the entire 38' height limit. The street façade need not enclose space, however it should maintain the street edge. For example the façade could be used to screen a roof deck on the second level. In keeping with the character of the area, roofs should appear to be flat from the street.

Location of Major Spaces

Kitchens, bathrooms, and storage areas should be placed to the rear of the initial development. At no time may these spaces have window openings on the street façade.

Accessibility

In accordance with the MPA Project intention that one be able to inhabit a MPA building system house from youth to old age, it is desirable that all MPA buildings have at least one unit that is accessible in accordance with ADA standards or designed to easily be converted to an accessible unit.

Affordability & Gentrification

The MPA Project acknowledges the fact that a redevelopment of this magnitude could be a major sponsor of gentrification within the larger community. Even so, one major objective of this thesis is to provide a mechanism whereby the existing community could continue to exist without being forced to leave. Ideally the new units that are being constructed would be purchased by persons who have some connection to the area (either through family, friends, or because they grew up there). In line with the idea of the “ever-adaptable” house, it is also assumed that the ideal new resident would be a young adult who may not yet be married and can grow a family with their home.

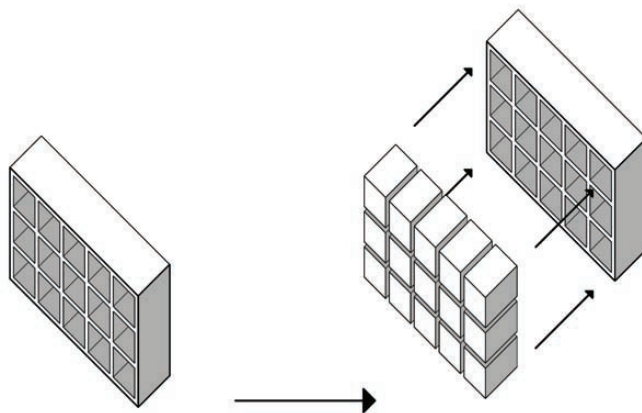
In order to allow this specific market the opportunity to buy these units and also to try to not escalate property value and taxes too rapidly, it is our intention that the initial development on the sites be built to be “affordable” Affordable housing is generally considered to be housing where the owner spends no more than 30% of his/her untaxed

income on housing. According to the Census, the median family income in Chicago for the year 2000 was \$42,724.00. This means that no more than \$1,068.10 should be spent on housing and utilities per month. As of December 13, 2004 the average mortgage rate in the City of Chicago was 5.42% (Chicago Tribune). If a family took out a thirty year mortgage for \$140,000.00 at 5.5% interest their monthly payment would be \$794.90. Using the Homan Square precedent (see p. 31), where square footages were as high as 1670gsf, the actual cost per square foot for the MPA initial development should be around \$83.00.

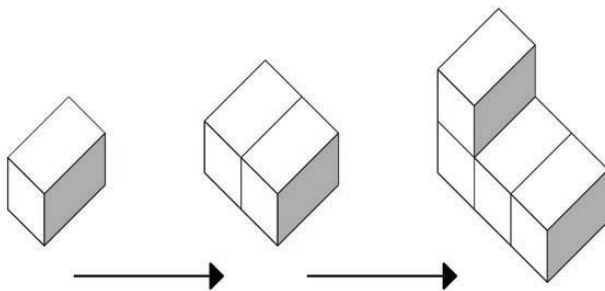
Chapter 7: Design Schemes

Conceptual Beginnings

Initially this thesis explored two different conceptual approaches to the design of a modular structure. The first method could be described as the “Book-in-Shelf” approach. In this scenario, a developer would fund the building of a scaffolding system on each site. The owner would then be able to buy pods or modules to fill in this scaffolding. In this approach, the initial framework would be built up to a point where it could accommodate the maximum amount of development allowed under the zoning.



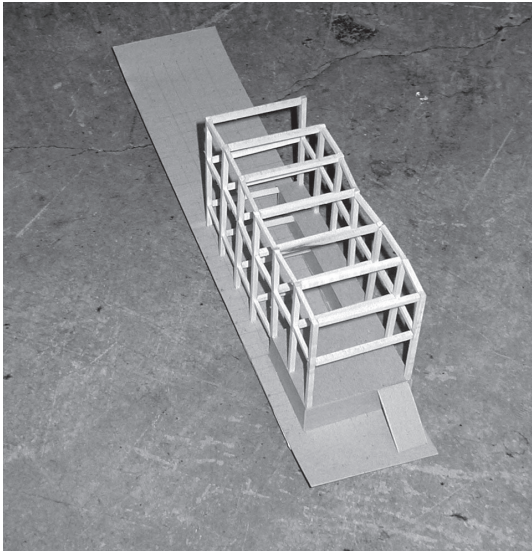
[Fig 52. Diagram of “Book Shelf” Approach]



[Fig 53. Diagram of the “Lego” Approach]

The second method could be described as the “Lego” approach. In this scenario a developer would fund the building of a plinth on each site. This plinth would connect to city utilities and house the unit’s furnace and water heater. The developer would then sell the land and the plinth to the owner who could expand by buying pods that would stack onto each other.

These two initial ideas

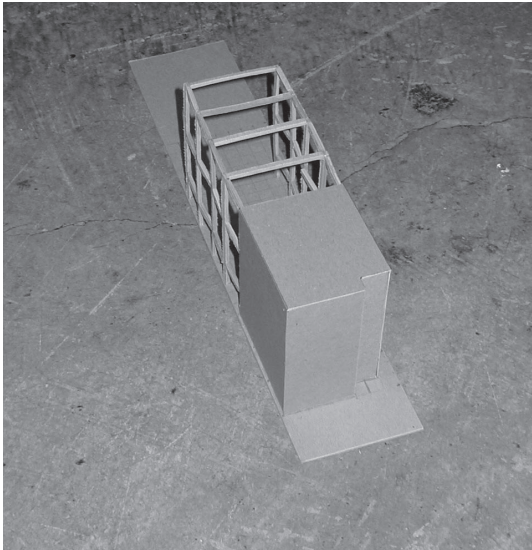


[Fig 54. Study Model] - 9' x 18'
structural frame

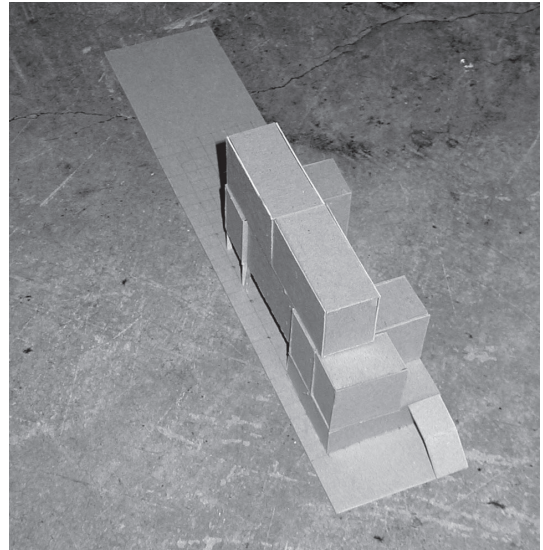
eventually evolved into a set of five study models which were each a variation on one or both of the above stated themes. During this stage a basic 3' x 3' x 3' module was used for size. The intent of these study models was to look at the potential impact of massing in relation to the existing buildings in the area.

Pre-Schematic Design Parties

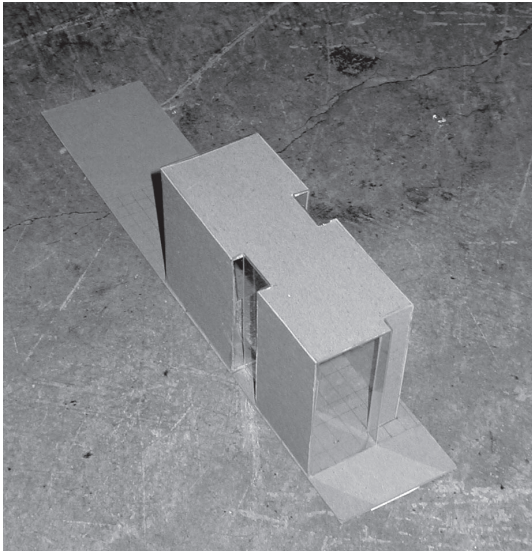
The next stage was the



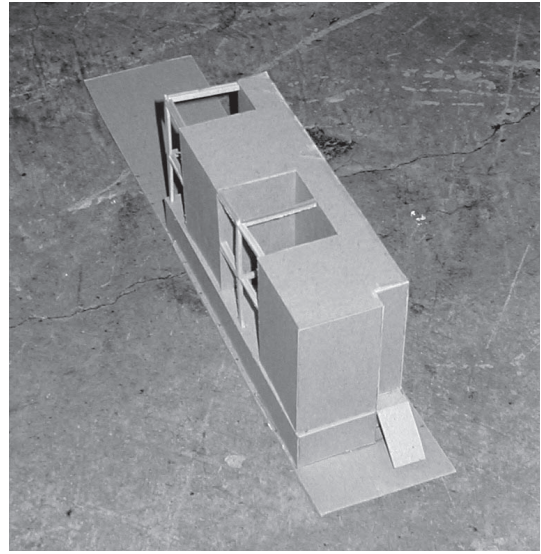
[Fig 55. Study Model] - Front building
with expansion to rear



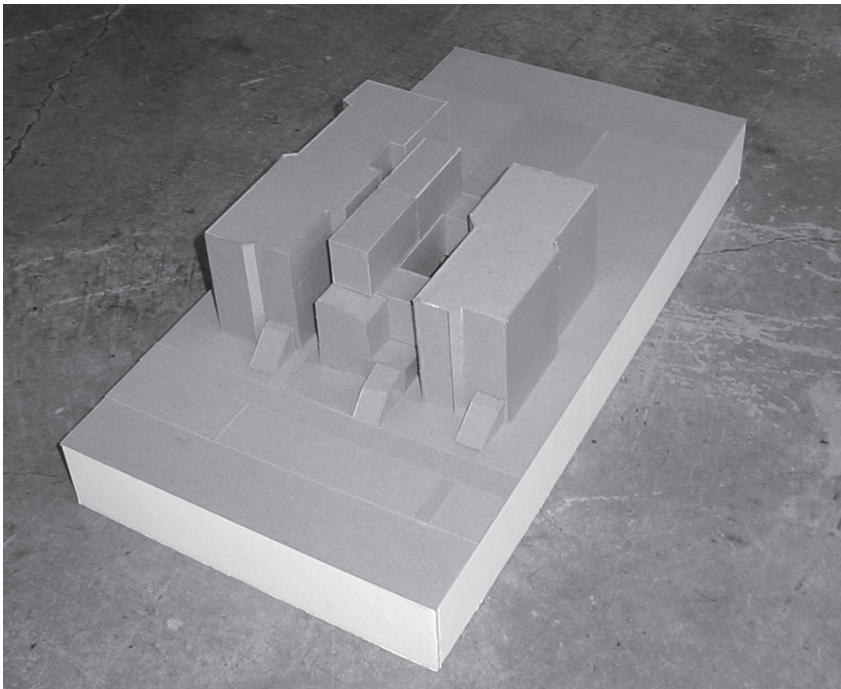
[Fig 56. Study Model] - Lego approach



[Fig 57. Study Model] - Base building with flexible interior space



[Fig 58. Study Model] - Base building with dedicated expansion areas



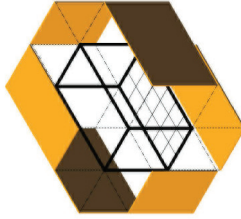
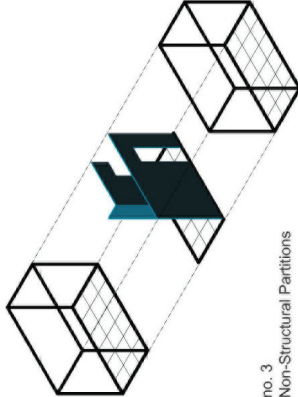
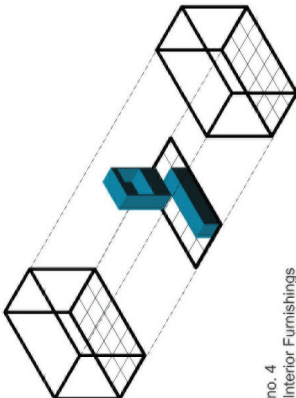




[Fig 59. Study Model] - Study model of existing buildings in area

development of three pre-schematic building system approaches. A concept board was designed based on each system and the “pros and cons” of each system were evaluated. Each building system was developed on the same 3’ x 3’ x 3’ module as the study models. Additionally, initial ideas on “components” for each system were proposed.

The first system was named the “Building Block System” (fig. 63) It had its roots in the “Lego” approach described above. In this system, the basic component was the 9’ x 18’ x 12’ frame. A skin cladding system would be used to complete the enclosure. Additionally, non-structural partitions and furnishings would be developed on the 3’ x 3’ module to define interior space. In this system, the section of the frame would be designed in such a way as to allow for dedicated mechanical runs. The house would expand based on the 9’ x 18’ x 12’ increment and could theoretically expand vertically as well as horizontally.

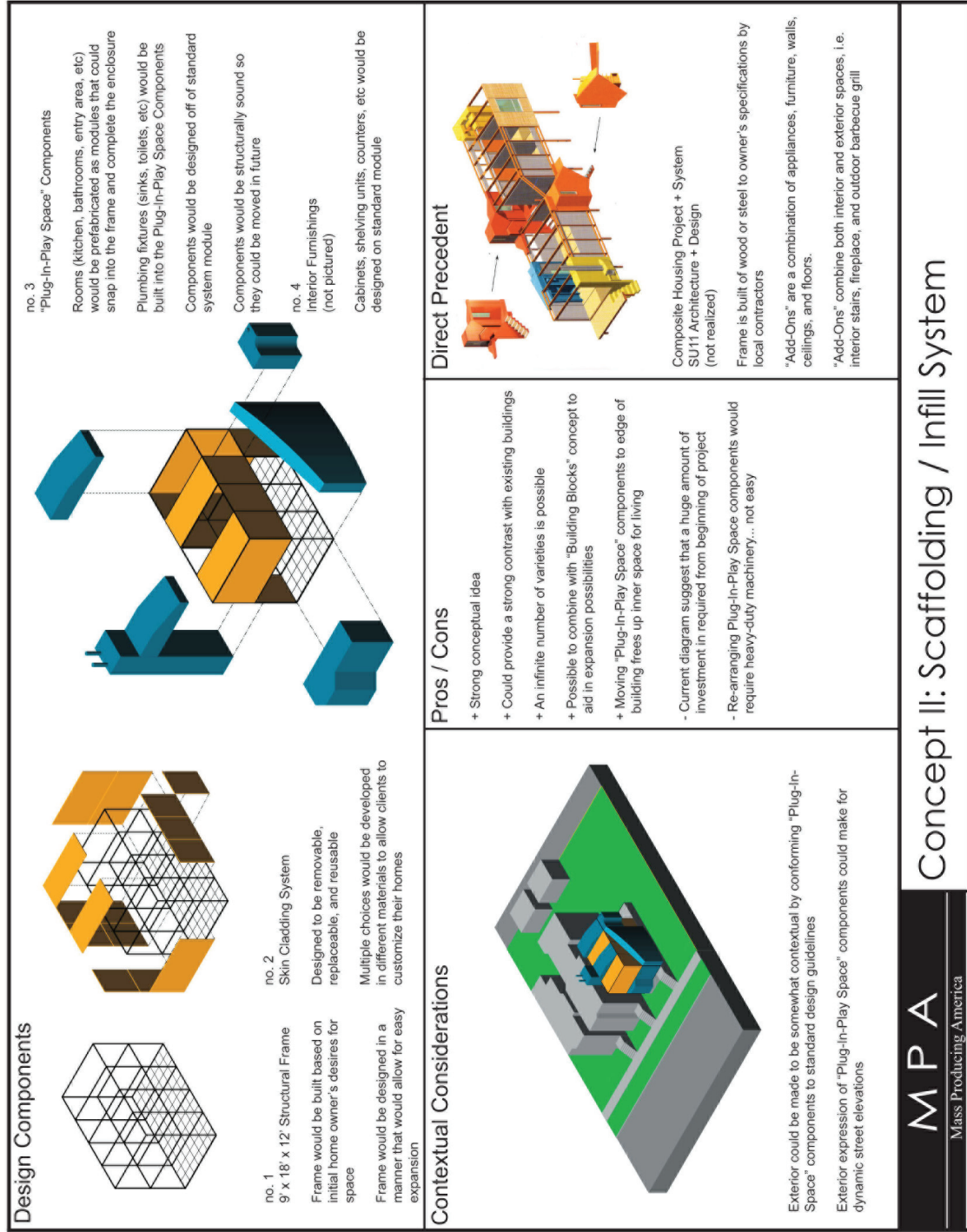
The second system was the “Scaffolding/Infill System” (fig. 64) In this system the components were a modulated structural frame, a cladding system, and lastly, a

Design Components				
	no. 1 9' x 18' Structural Frame	Frames would be designed to interlock with other frames both horizontally and vertically	 <p>The composition of structural components on site would be completely determined by owner thus this system has a strong chance of not "blending in" with neighbors</p>	
		no. 2 Skin Cladding System		Designed to be removable, replaceable, and reusable
		no. 3 Non-Structural Partitions		Would be designed on a standard module and used to subdivide interior spaces
		no. 4 Interior Furnishings		Cabinets, shelving units, counters, etc would be designed on standard module
Plumbing items, (sinks, toilets, showers, etc) would also be included in this category				
Contextual Considerations		Pros / Cons		
 <p>The composition of structural components on site would be completely determined by owner thus this system has a strong chance of not "blending in" with neighbors</p>		<p>Pros / Cons</p> <ul style="list-style-type: none">+ Strong conceptual idea+ Could provide a strong contrast with existing buildings+ An infinite number of varieties is possible- Doesn't lend itself to multiple families on same lot- Vertical circulation could be problematic given structural system- Plumbing & HVAC runs are extremely unresolved and at odds with idea of flexibility		
		<p>Direct Precedent</p>  <p>Program Container System (PRO/con) Jones, Partners Architecture (not realized)</p> <p>System that utilizes used shipping containers to provide shelter.</p> <p>Containers would be leased or brought by home owners.</p> <p>Each unit would be pre-made to be a certain room (kitchen, office, closet, ...)</p>		
Concept I: Building Block System				
M P A		Mass Producing America		

[Fig 60. Building Block System Concept Board]

number of “plug-in-play space” components. The cladding system and the “plug-in-play space” components were conceived being able to snap into the structural frame. The “plug-in-play space” components would be composed of spaces such as kitchens, stairs, bathrooms, and bedrooms. The structure and mechanical systems would be designed in such a way as to be able to receive these “plug-in-play space” components in any given bay. Thus with a number of prefabricated parts, the owner could easily layout his/her house to their individual wishes. It is conceived that multiple variations on each of the standard “plug-in-play space” components would be developed (ie, one could choose from any of twelve possible bathroom components).

The final system was named the “Weathering Shed / Internal Pod System” (fig. 65). In this system a more traditional shell or base building would be built, but not fitted out with interior spaces. All interior spaces would be developed as individual pods. The owner could then select which pods he/she wanted to in their home and arrange them in



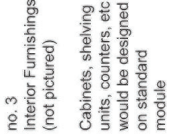

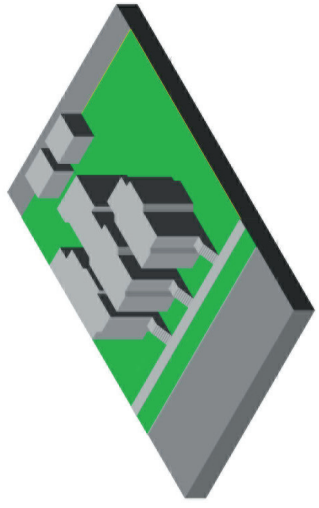



M P A
Mass Producing America

Concept II: Scaffolding / Infill System

[Fig 61. Scaffolding / Infill System Concept Board]

whatever manner best suited their family. In this system the structure would be more or less fixed, but the mechanical systems would be designed to allow the user to move the pods around in any way they wanted.

Design Components		Integration	
<div> <div>  <p>no. 1 Weathering Shed</p> <p>Wearhouse-like volume would be designed to withstand exterior forces</p> <p>Could be either a prefab or traditional construction</p> </div> <div>  <p>no. 2 Interior Pods</p> <p>Pods would be rooms (i.e., kitchen, bathroom, bedroom, etc)</p> <p>Pods could be moved and re-arranged within shed</p> </div> <div>  <p>no. 3 Interior Furnishings (not pictured)</p> <p>Cabinets, shelving units, counters, etc would be designed on standard module</p> </div> </div>		 <p>Shed would be designed based off of standard module to better accommodate pods and furnishings</p> <p>Shed would be built with multiple "hook ups" for pods located throughout the unit so pods that require plumbing and electricity could plug into spaces that were predetermined</p>	
Contextual Considerations		Pros / Cons	Direct Precedent
 <p>Shed would be designed on a case by case bases, but governed by design guidelines</p> <p>Could potentially not stand out at all</p>		<ul style="list-style-type: none"> + Strong conceptual idea + Could be very contextual in nature + HVAC would be standard + Encourages direct interaction with Architect + Potential for more conventional construction (stuff that is known) + Rearranging interior would be extremely easy - Current diagram suggest that a huge amount of investment in required from beginning of project - Current diagram suggest that initial development is a two-story construction 	 <p>Naked House Shigeru Ban Tokyo, Japan</p> <p>The boxes are used as bedrooms</p> <p>Rooms are mobile and can be moved around by family</p>
M P A Mass Producing America			
Concept III: Weathering Shed / Internal Pods			

[Fig 62. Weathering Shed / Internal Pods Concept Board]

Chapter 8: System Design

Included in this chapter are the final drawings for the MPA Project Housing System. These are the boards, in their original format (although reduced from 24" x 36" size), from the thesis defense held at the University of Maryland School of Architecture, Planning and Preservation on the 16th of May, 2005.

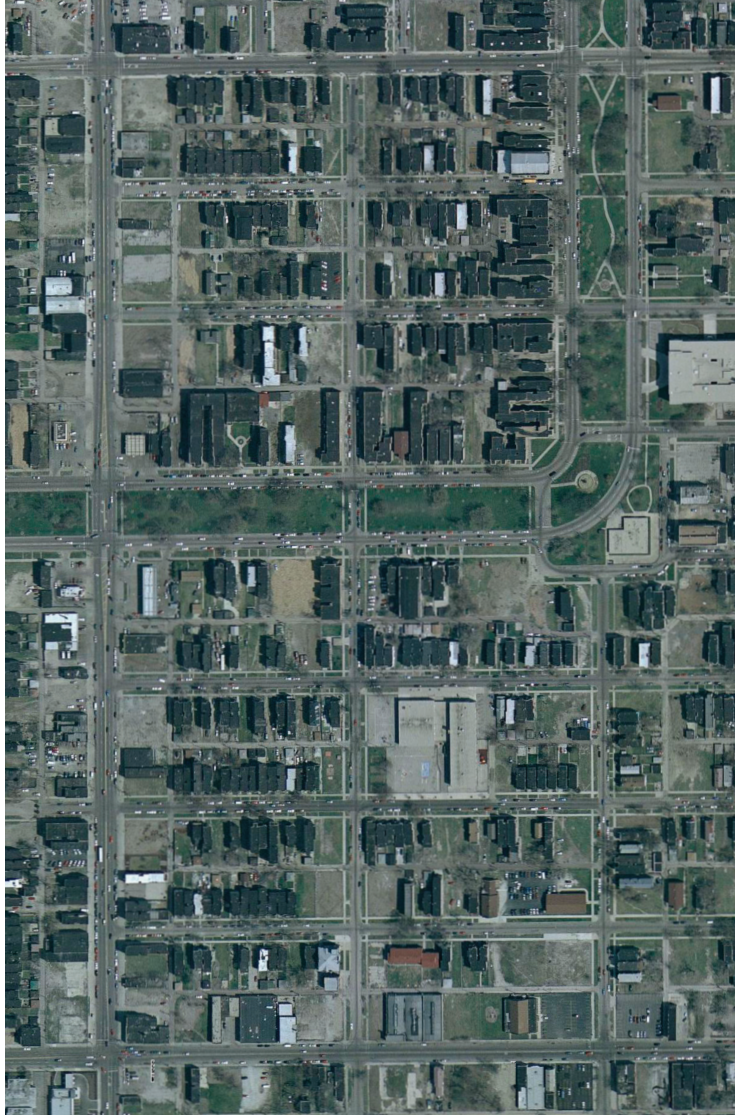
Reason Boards

The “reason” or justification for this project has largely been laid out over the past six chapters. The purpose of these boards was to familiarize the guest jury to the area. Figure 64 begins to show in a more objective manner how critical this project is to the North Lawndale Community by emphasizing the more striking statistics.

Figure 65 shows the housing matrix which was conceived during the pro-thesis semester and was used throughout the design semester to guide programmatic needs. Because this project has been conceived as an ever-changing house, it is not possible to propose a traditional fixed program. Certain rooms would be present at all stages, such as bathroom and kitchen, but sizes would never be fixed. Additionally certain people at different stages in life need different amenities. Figure 65 shows how conceptually the unit and spaces could evolve with the owner over time

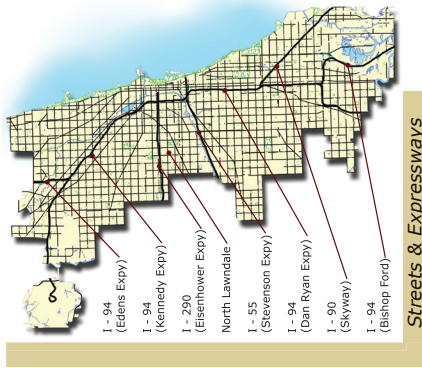
Reason

Mass Producing America Neighborhood Revitalization in North Lawndale - Chicago, IL

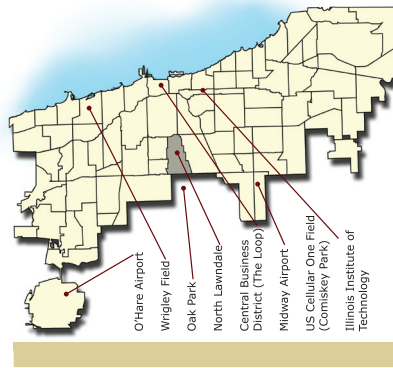


Marcus A. Cross

050516 MPA PROJECT



Streets & Expressways



Neighborhood Divisions

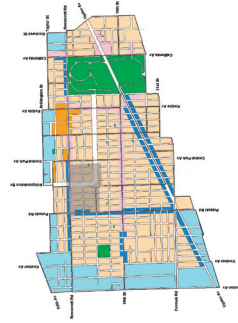
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[Fig 63. Presentation Board "Reason 1"]

Reason

Key Statistics

Current Area Population	41,000
Peak Population	125,000 (1960)
Chicago Median Family Income	\$43,848
Area Median Family Income	\$20,253
Total Area Housing Units	14,620
Owner Occupied Units	22%
Renter Occupied Units	62%
Vacant Units	15%
Typical Existing Density	18 Dwelling Units / Acre
Proposed Density	24 Dwelling Units / Acre



North Lawndale Zoning



Religious Land Use










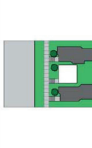
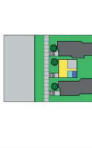
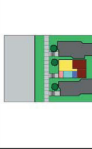
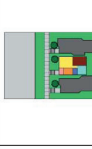
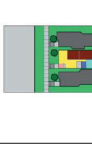
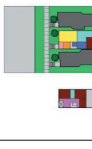
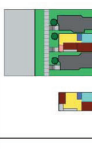

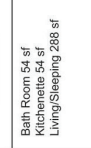
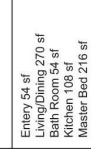
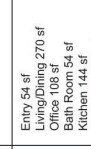
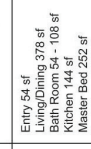
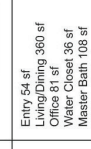
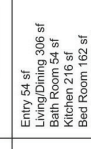
Educational Land Use



Commercial Land Use

[Fig 64. Presentation Board “Reason 2”]

Reason

MPA	Housing/Family Development Conceptual Matrix						
Family Stage	Developer	Single	Housemates / Non-relational	Couple / Newlyweds	Small Family	Large Family	Small Family renting space to Singles
							
Site Impact							
Space Plan							
Tabulation	Development Plinth Connection w/ city utilities 576 sf	Bath Room 54 sf Kitchenette 54 sf Living/Sleeping 288 sf	Entry 54 sf Living/Dining 270 sf Bath Room 54 sf Kitchen 108 sf Master Bed 216 sf Bed Room 144 sf	Entry 54 sf Living/Dining 270 sf Office 108 sf Bath Room 54 sf Kitchen 144 sf Master Bed 216 sf Bed Room 144 sf	Entry 54 sf Living/Dining 378 sf Bath Room 54 - 108 sf Kitchen 144 sf Master Bed 216 sf Bed Room 160 sf	Entry 54 sf Living/Dining 360 sf Office 81 sf Water Closet 36 sf Master Bath 108 sf Kitchen 180 sf Master Bed 180 sf 3 Bed Rooms 108-180 sf Bath Room 54 sf Family Space 180 sf	Entry 54 sf Living/Dining 306 sf Bath Room 54 sf Kitchen 216 sf Bed Room 162 sf Master Bed 288 sf Living/Dining 337 sf Bath Room 54 sf 2 Bed Rooms 135sf / 216 sf Kitchen 216 sf

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[Fig 65. Presentation Board “Reason 3”]

Site Boards

Figure 66 shows that three-hundred-and-fifty-two lots within the MPA Project area have been identified as potential building sites. The majority of these lots are currently vacant (no structure standing on the site). The remainder are either under-developed or are occupied by abandoned buildings.

Given the size of the project area, the number of vacant parcels, and the vast variety of building types needed to fill those vacancies, it becomes necessary to develop some over-arching framework within which the architect can work. To this end, the MPA Project is seen as a part of a larger revitalization effort encompassing the entire North Lawndale Community as described in chapter two. Figure 66 shows how the project area will be divided. Corner and infill housing sites would be covered by the MPA Project. Retail and Commercial sites are left to a future, un-named developer. Additionally, some sites located on Independence Boulevard which seem to be better suited for larger multi-family development are left for a future developer. To this end the MPA Project is exclusively concerned with the development of infill and corner units (see fig 67).

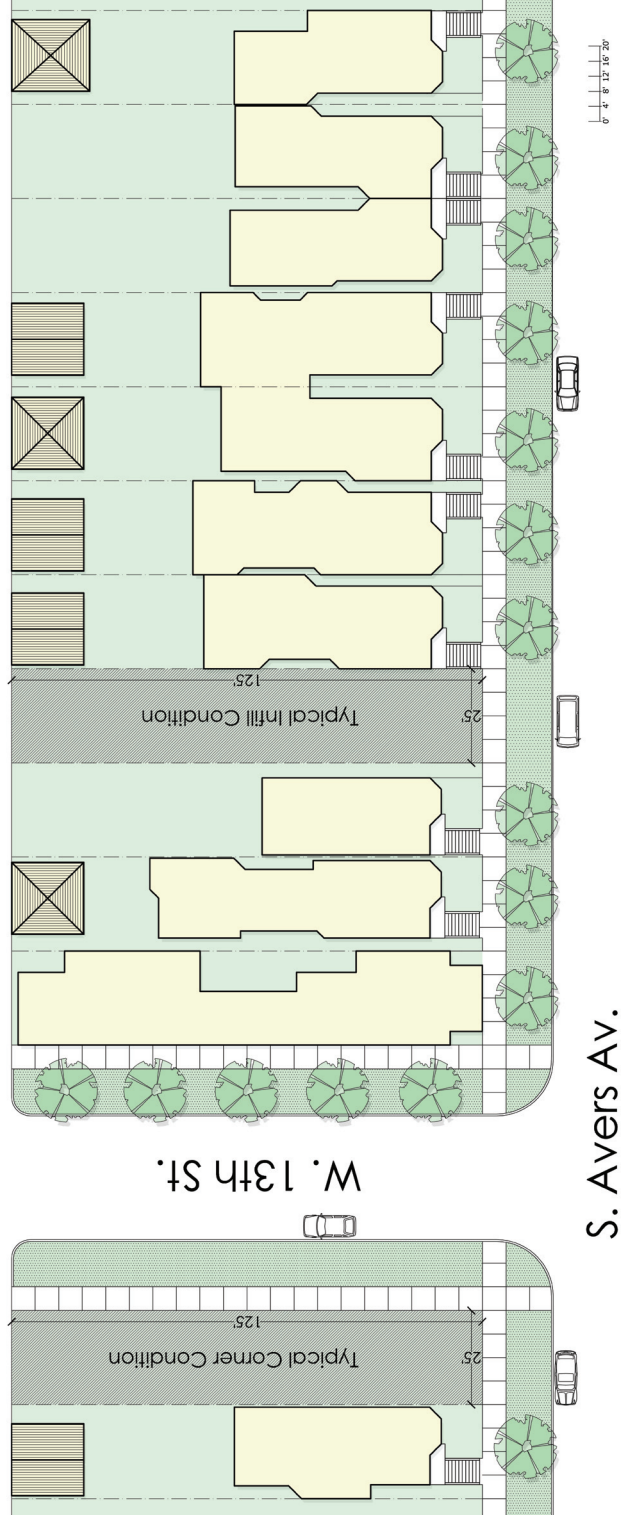
Figures 68 and 69 show the response to the design guidelines proposed in chapter 6. The basic typology structure of a Chicago Two-Flat has been used as the starting point of the infill units. The street facades have been treated in a way that is in keeping with the general character of the North Lawndale Community. The exception would be the retail space that has been added to the ground floor of the corner building.

Site



[Fig 66. Presentation Board “Site 1”]

Site

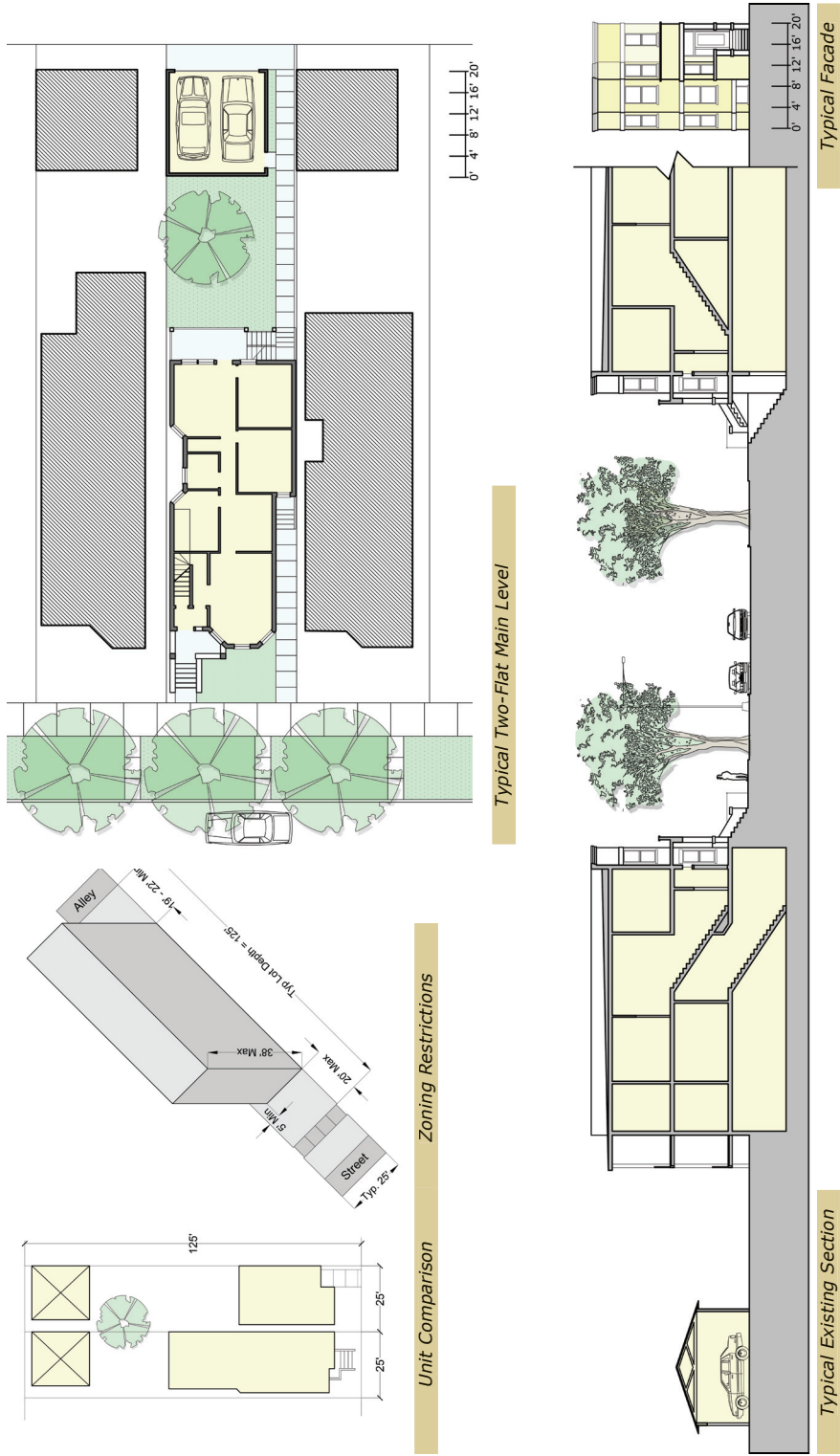


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[Fig 67. Presentation Board “Site 2”]

Site



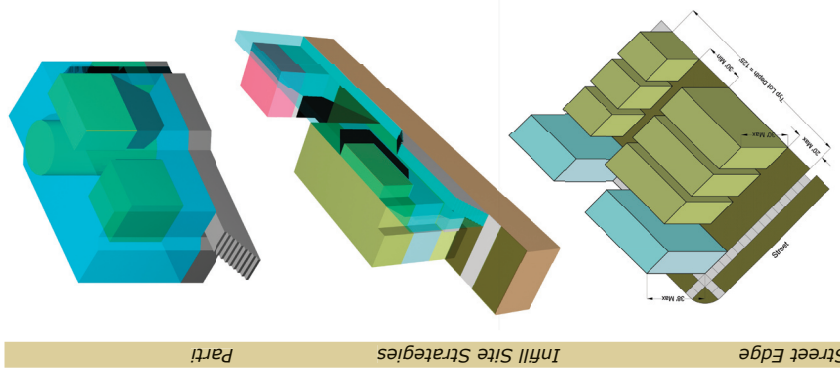
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[Fig 68. Presentation Board "Site 3"]

Site



Proposed Street Perspective



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[Fig 69. Presentation Board “Site 4”]

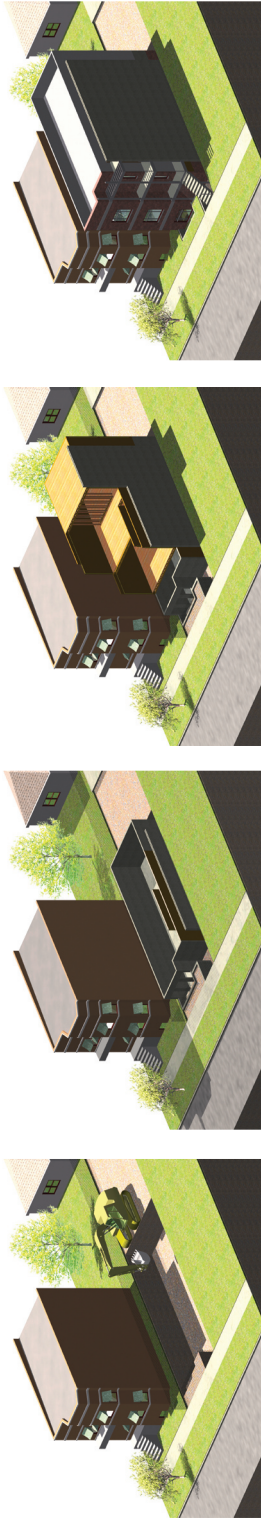
Construction Boards

The major innovation of the MPA system can be seen in the construction drawings. As Fig 70 shows much of the construction process is traditional. Through the use of SIPs (Structurally Insulated Panels), the overall time of construction would be reduced. The use of sips has been restricted to the exterior structure of the home. This was done to allow for exterior and interior finishes to be built to custom.

Figure 71 highlights another key innovation, namely the use of a central distribution core in which all plumbing and HVAC are run. The floor is composed of 4' wide prefabricated hollow slab that allows air to circulate through, creating a plenum. The HVAC supplies are run through the core and simply end at the floor deck, thus there is no duct work required. To maximize the flexibility of the units, vents can be “punched” in the floor deck as needed. In the winter more air would be directed at the lower level since warm air rises and in the summer more air would be directed at the upper level since cool air will fall.

Plumbing is also handed through this distribution core. All plumbing needs are stacked around the core to keep from running pipes through partition walls. All supply is handled through PEX (PolyEthylene) piping. This plastic tubing is more flexible and allows the piping to weave between the studs of the core. Additionally with this system, every fixture in the house has its own individual shutoff valve located at the manifold in the basement. This is a great benefit if at anytime the piping needs to be replaced, as you can leave all unaffected fixtures on and simply turn off the one that you are working on.

Construction

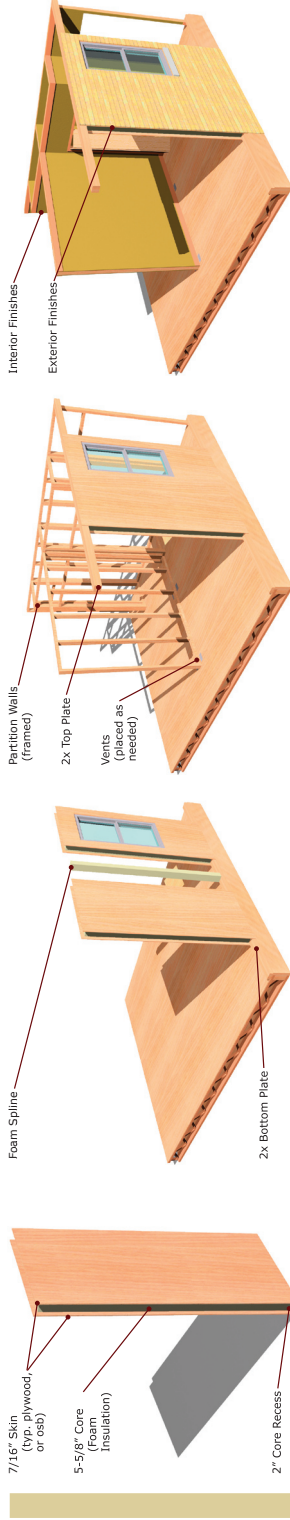


Excavation

Foundation

SIPs Construction

Exterior Finishes

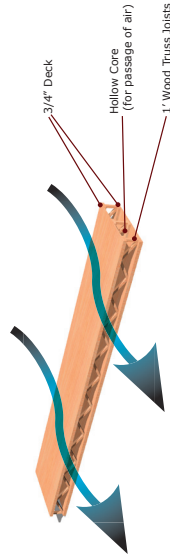


Structurally Insulated Panel

SIPs Construction

SIPs Construction

SIPs Construction



Structural Air Plenum Floor Slab

Item	Material	Labor	Equipment	Total	% of Total
Rough Carpentry	\$14,002.00	\$22,695.00	--	\$36,697.00	17.8
Insulation	\$2,622.00	\$1,968.00	--	\$4,590.00	2.2
Plumbing Rough-in and Connection	\$2,132.00	\$5,686.00	\$324.00	\$8,142.00	3.9
Heating and Cooling Systems	\$4,452.00	\$6,678.00	--	\$11,130.00	5.4

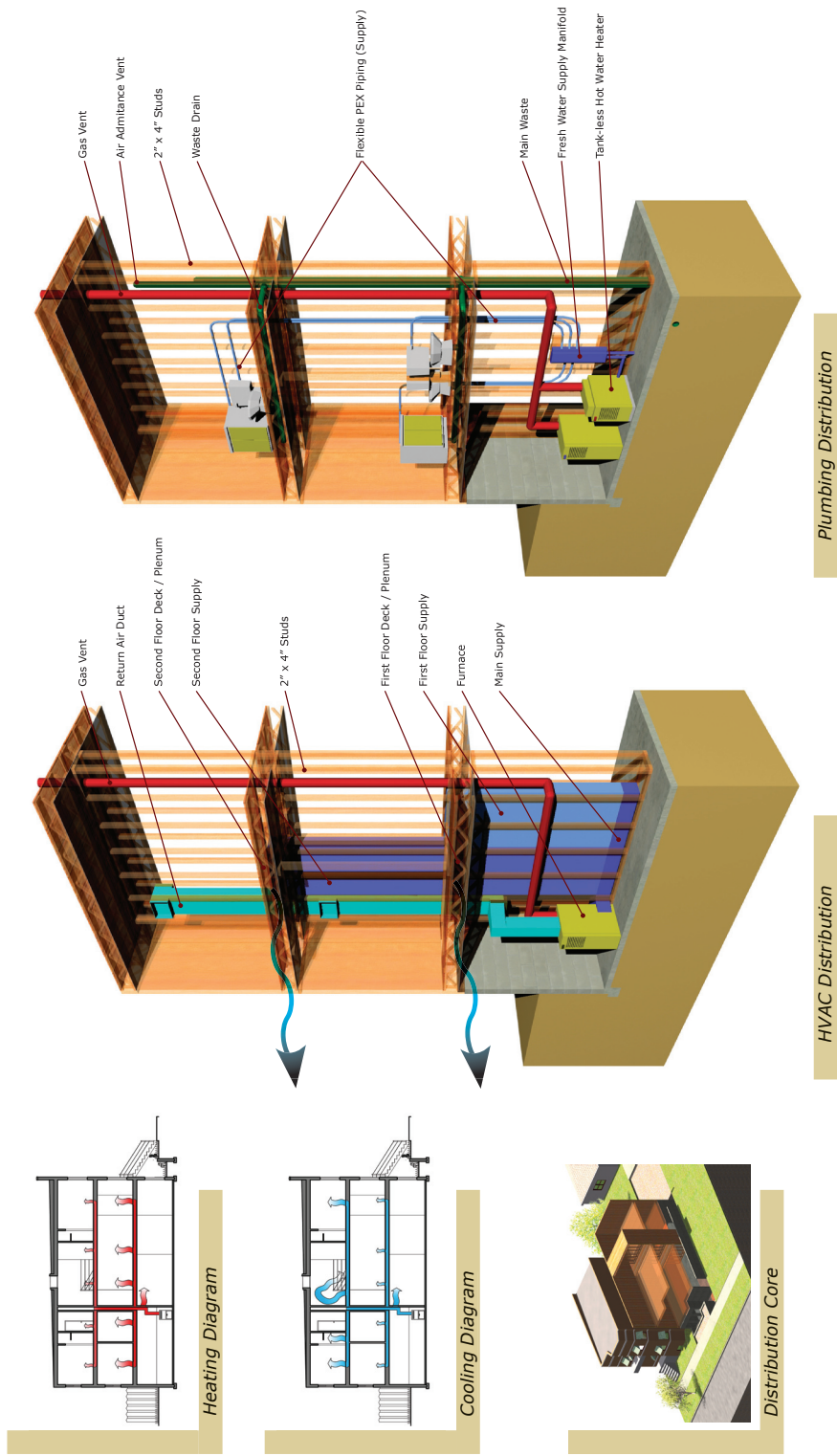
Traditional Construction Cost

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[Fig 70. Presentation Board "Construction 1"]

Construction

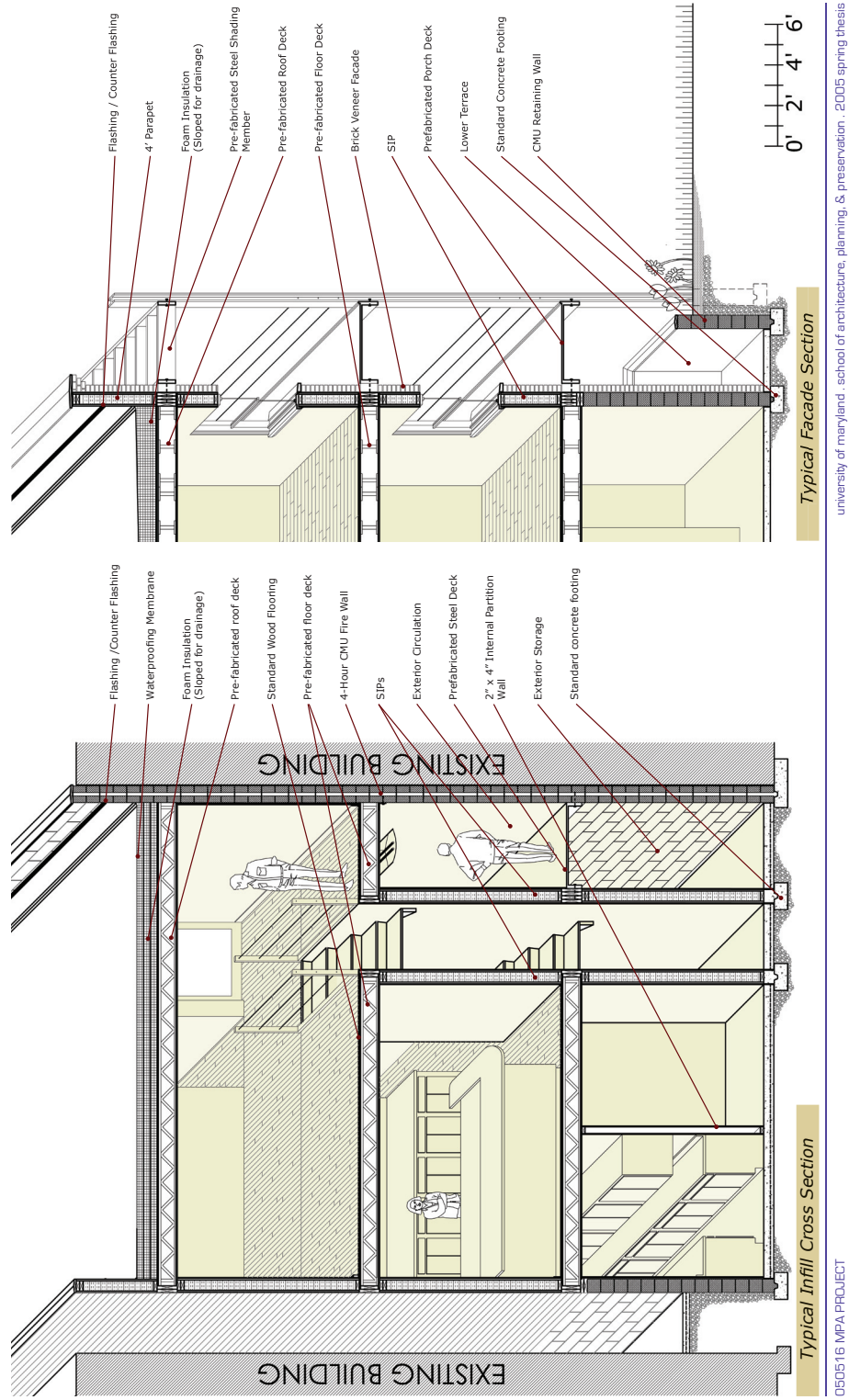


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[Fig 71. Presentation Board "Construction 2"]

Construction



[Fig 72. Presentation Board "Construction 3"]

Image Boards & Flexibility Boards

Finally, the Image and flexibility boards are intended to give an idea of what the system could produce. It is not necessarily the case that there is a one for one match up between the facades and the unit plans, rather the idea is that any of the facades could be interchangeable with almost any of the unit plans.

The major difference in the infill plans are the sections. In research it became clear that the difference between an “affordable” house and a luxury home was determined in large part by the presence of a double height space. Since the MPA system is aimed at providing housing for everyone from a large family to newlyweds, the sectional difference became critical.

All plans show an accessory apartment option over the garage, some show an English basement accessory apartment as well. In other instances the basement has been used as a home office or a large family room.

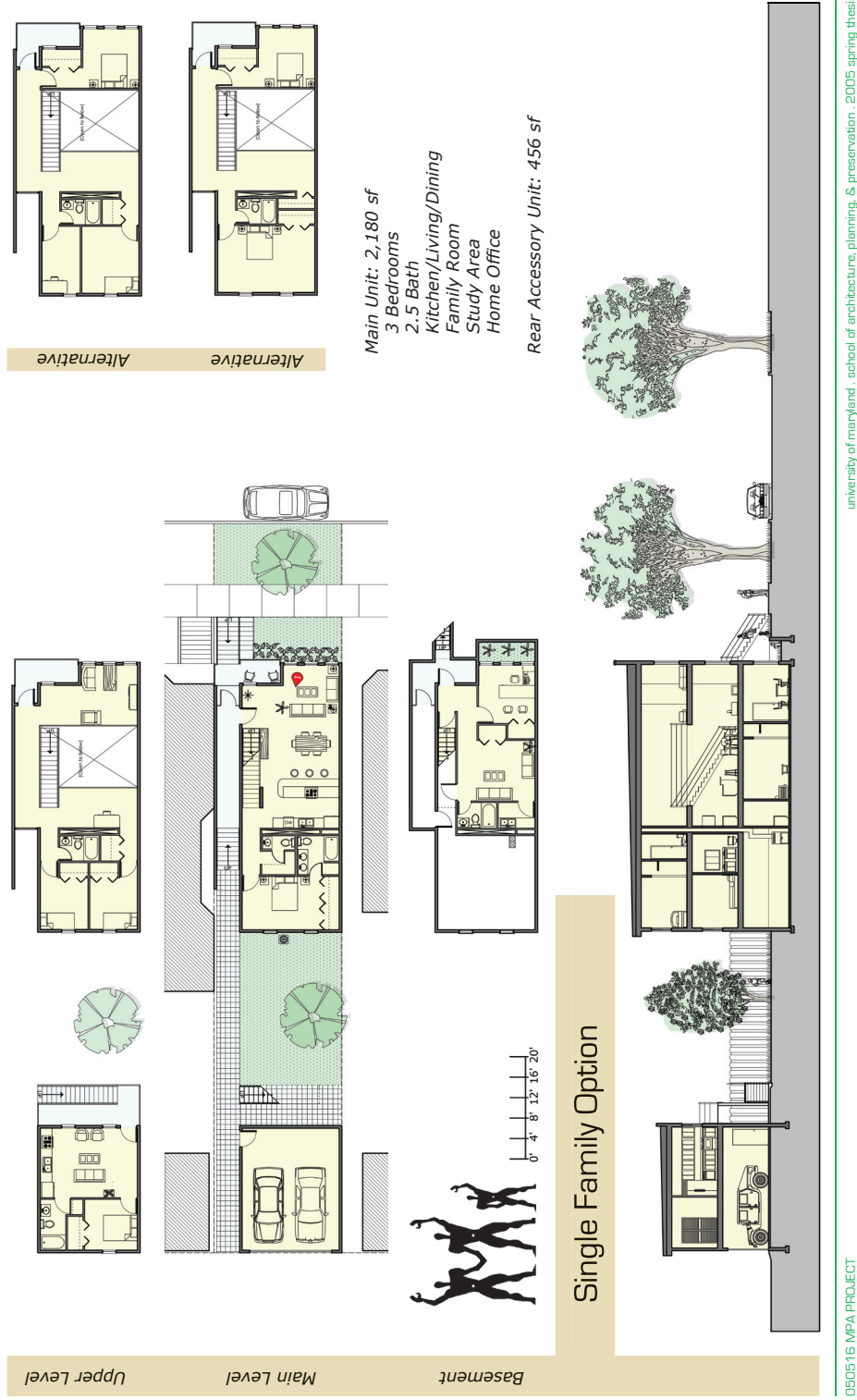
The retail space in the corner building is conceived as a small café or other establishment to be used primarily by the local residents. No additional parking is provided as it is anticipated that all patrons would be in walking distance. Moreover because of the limited amount of square footage, the type of retail is highly limited to things which would not offend the neighbors.

The facades are the result of the design guidelines and design development over the course of a semester. Some options are better suited for units with double height space in the front, while other are better suited for units with two independent floors. One option shows the possibility of a root top terrace, where the railing actually completes the

requirement of making the building appear to be 30' tall.

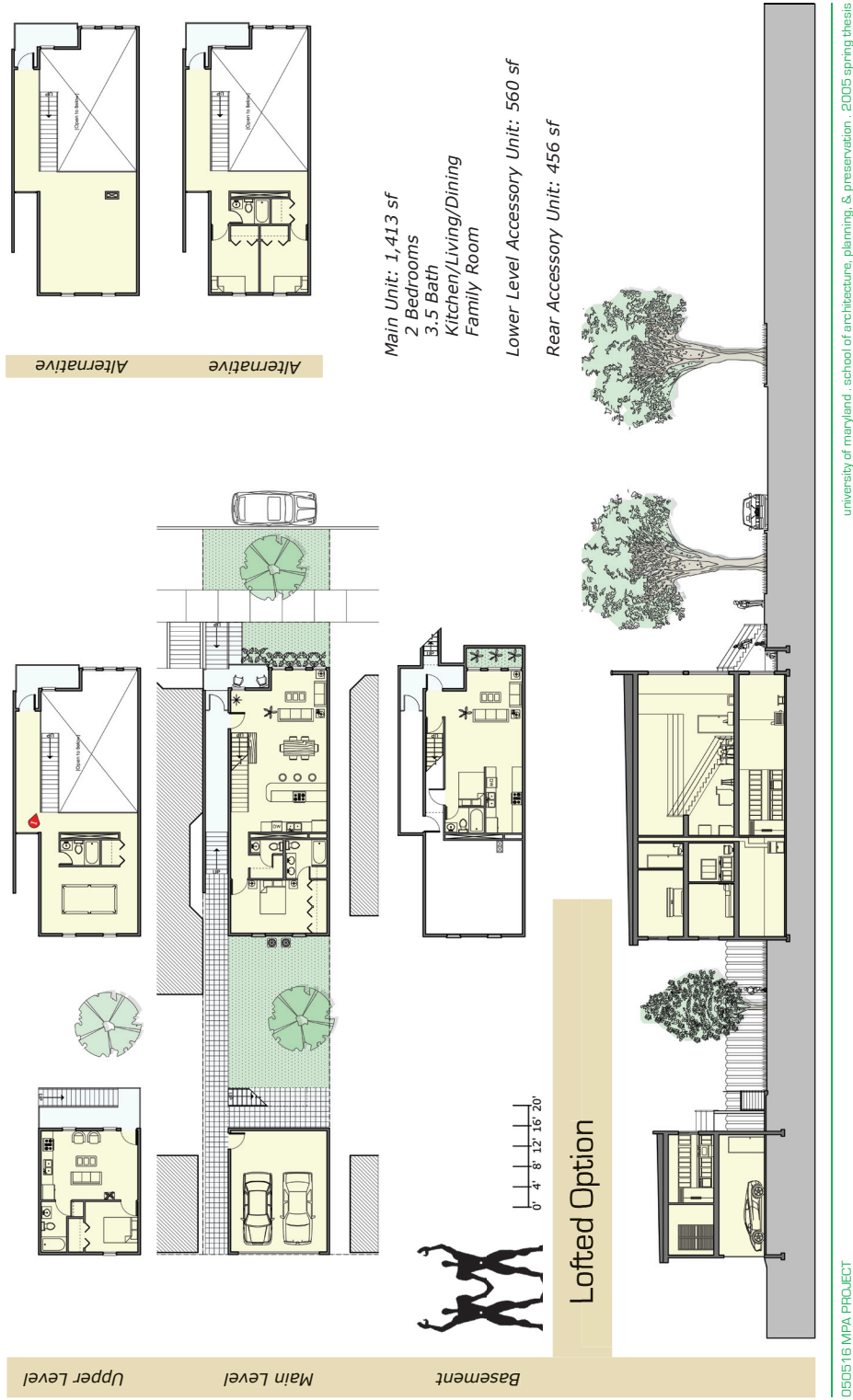
The interior perspectives are intended to show the variation of space created through the location of the double height space. Interior finishes are not specified in too much detail, as these are options that are best left to the owners' individual taste.

Flexibility



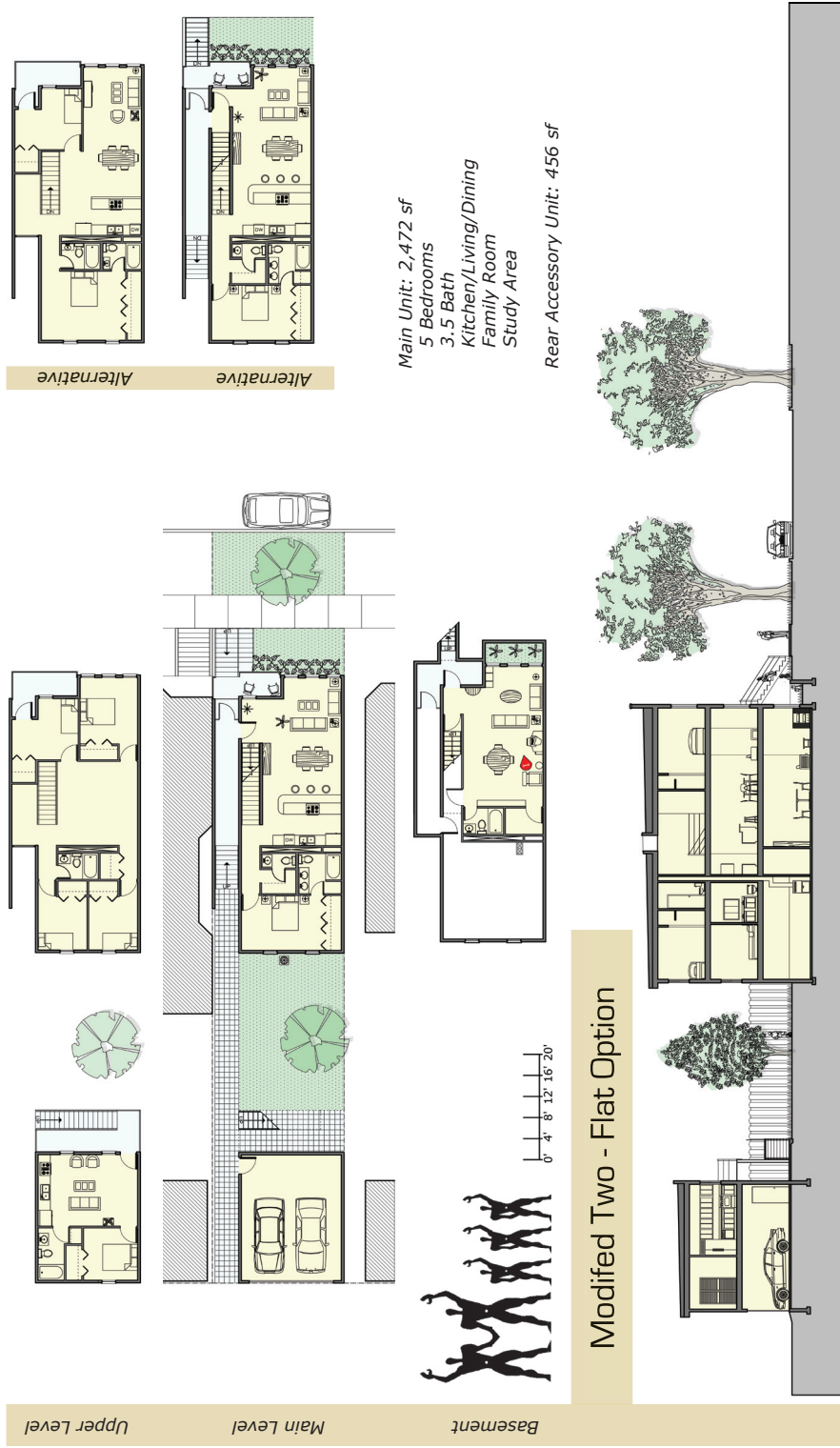
[Fig 73. Presentation Board “Flexibility 1”]

Flexibility



[Fig 74. Presentation Board “Flexibility 2”]

Flexibility



[Fig 75. Presentation Board “Flexibility 3”]

Flexibility

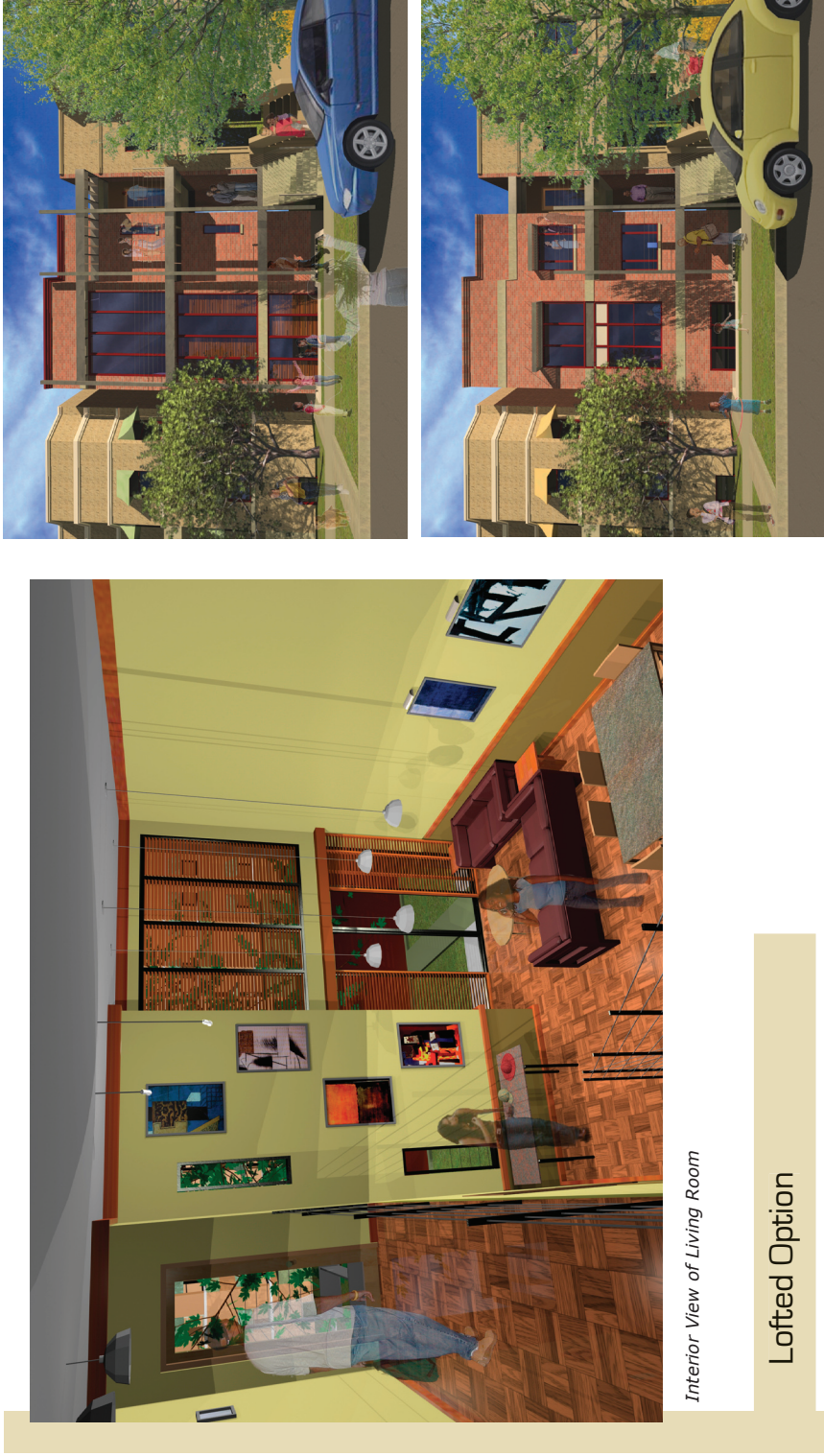


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[Fig 76. Presentation Board “Flexibility 4”]

Image



Interior View of Living Room

Lofted Option

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[Fig 77. Presentation Board “Image 1”]

Image



Interior View into Dining Room & Kitchen

Single Family Option



[Fig 78. Presentation Board “Image 2”]

Image



Interior View of English Basement Unit

Modified Two - Flat Option



[Fig 79. Presentation Board “Image 3”]

Image



Interior View of Ground Level Cafe

Corner Mixed-Use Option



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[Fig 80. Presentation Board “Image 4”]

Chapter 10: Conclusion

The question of affordable housing is not new. It has been and continues to be a heated source of discussion and debate amongst architects. Le Corbusier's worker's housing at Pessac France, Walter Gropius and Konrad Wachsmann's General Panel System, Buckminster Fuller's Dymaxion House, The Luxston Housing Corporation, Operation Breakthrough, the list goes on and on. All of these were architectural attempts to provide good housing to the masses relying primarily on cutting edge technology, gadgetry, and in some cases technology that was simply insufficient to match industry demands. All these provided provocative architectonic and aesthetic solutions to the question of housing that continue to inspire the architectural community. While each of these projects can and should be praised for advancing the cause of affordable housing, one cannot overlook the simple fact that if judged by their own initial claims of greatness, each of them failed.

I propose that there are at least two major lessons that can be learned from this phenomenon. The first is that, any serious attempt to solve the housing problem in this country will be one that works with and advances standard, conventional building technologies and practices – not one that attempts to replace them. This is a hard and disturbing fact for many of us to face (especially those in the world of academia). The creative and idealistic side of us begs to believe that we can and should re-invent the wheel, and that somehow we can make it better. The truth that I have discovered in this process is that the housing industry already makes an exceptionally good “wheel”. The traditional stick-built house is fast to construct, relatively cheap to build, and really quite

easy to customize to an owner's personal taste. It is exceptionally difficult to find a reason for the housing industry to embrace any other form of construction.

The second lesson is that the link between modular, panelized, prefabricated systems and the affordable housing problem tends to be much stronger conceptually than it is in reality. In exploring these options I was continuously confronted by the problem of designing overly complicated connections that would actually drive the cost of the unit up. Not to mention the cost and complications of moving large blocks of buildings to the site (this is not at all impossible, however it can not be denied that it adds another layer of complexity and potential cost to the problem). These problems tend to magnify themselves considerably when one moves down in scale from multi-family housing to single family housing. The economics of these systems do not seem to work at the scale of this project.

The system proposed by the MPA Project takes advantage of both of these lessons. Through the use of SIPs, labor and onsite construction cost are reduced. Through the use of the heating/cooling core, material cost on duct work and labor are reduced. Moreover this system, by providing a fairly generic shell of a building and allowing complete customization of select key elements (the street façade, and interior organization) could easily compete with the flexibility of a stick-built home.

In the end, the project may be criticized for being too "traditional," both in its construction and its aesthetics. However, in the course of design I arrived at a fork in the road. To the left was the alluring possibility of designing a "new way" of doing things – a strictly prefabricated modular home, better than all of the systems proposed in the past century (not an easy task to accomplish in one semester). To the right was real

problem of a neighborhood in desperate need of a viable housing solution. For many of the reasons already discussed, it became clear that these two options were not compatible. It was not a light decision to choose the right side, but it should be understood that this decision was quite deliberate. While the resulting system may be criticized for its traditional nature, it can only be praised for its honest solution to a real problem.

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